FS 70

Trawl Sonar System

Operator Manual

SIMRAD

Kongsberg Mesotech Ltd.
Port Coquitlam, BC - Canada

FS70 Trawl Sonar System

Operator manual

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1 SYSTEM FAMILIARIZATION

1.1 Overview

The SIMRAD FS 70 Series is a third wire trawl monitoring system for pelagic and bottom fishing trawlers. The system provides real time information from the trawl sonar head and the associated sensors to the bridge, thus maximizing fishing efficiency and reducing sea time.

The FS 70 vertical trawl sonar allows the operator to see the complete net opening and operation by displaying individual fish targets in the vertical plane, the fish school location, bottom/net location and net geometry. In addition to the vertical monitoring, the FS 70 also allows the operator to measure the spread of the trawl door, view and skim banks to avoid reefs and locate boulders on the ocean floor that may damage the trawl net.

The 200 kHz Echo Sounder capability ensures maximum control of the foot rope during the tow. The active motion sensor for pitch and roll comes as a standard feature.

The trawl system's sensor module and addition of sensors from the Simrad PI family allows the operator to monitor trawl depth, water temperature and receive information from the catch sensors, the doors spread sensors, the cod end depth sensor and from the rip or bottom contact sensor.

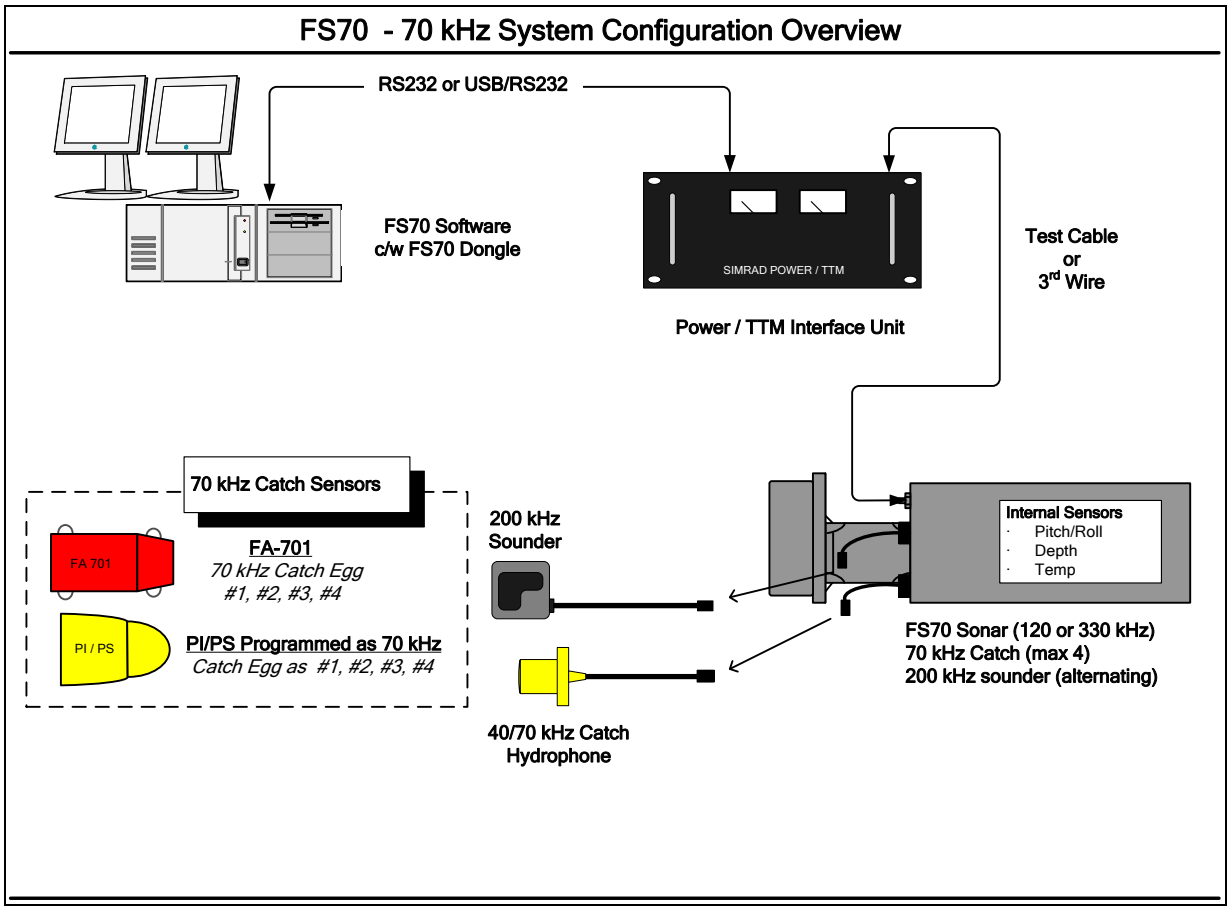
The FS Trawl Sonar Series is a modular system. It is operated with ease through direct access mouse and keyboard operated menus. The major benefit of the third wire trawl sonar system is that it prevents the loss of communication with the trawl instrumentation as the vessel is changing course and or during heavy sea.

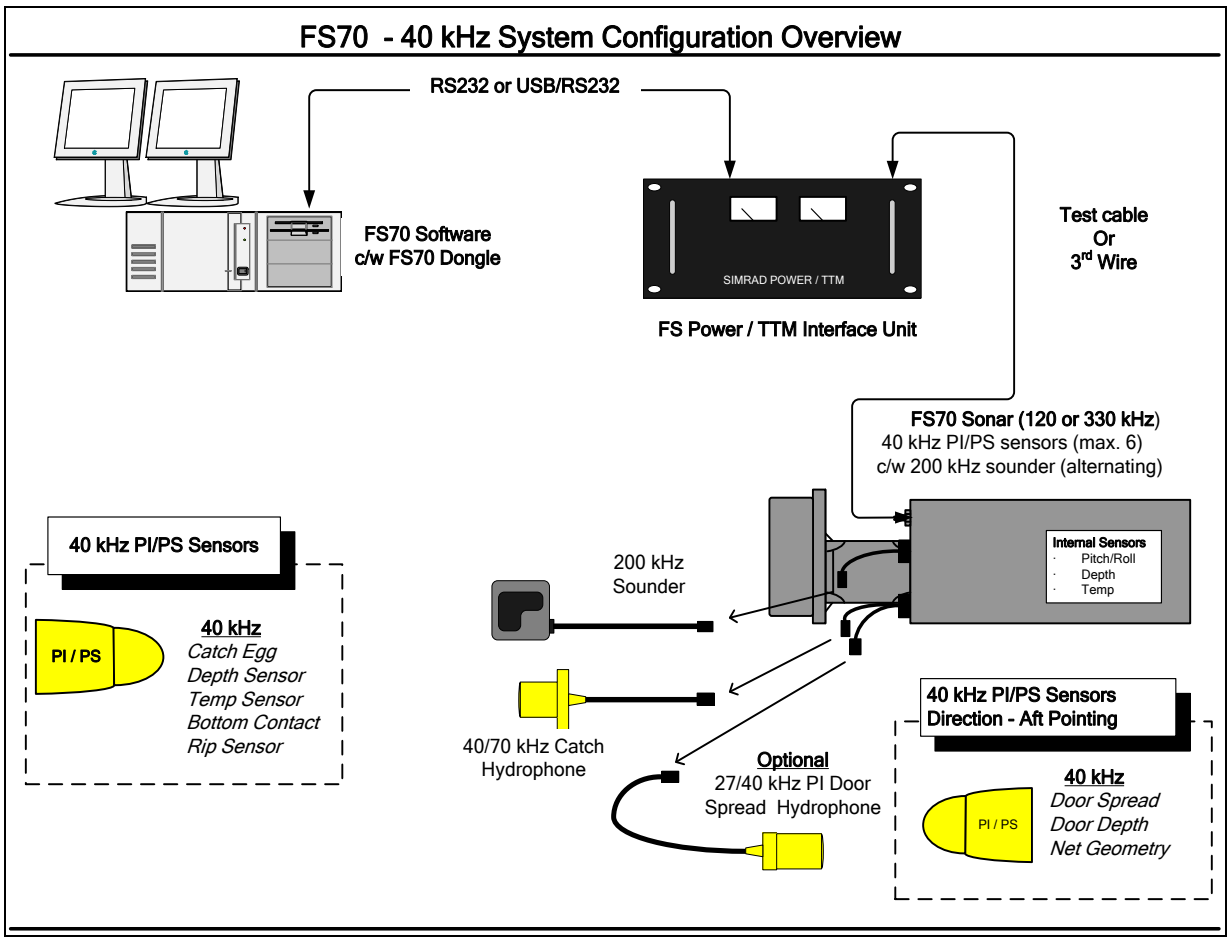
1.2 Equipment List

A typical FS70 Trawl Monitoring System consists of:

- FS 70 Deployment Housing
- FS 70, Vertical Sonar Head 120kHz, or 330kHz,
- 200kHz Sounder Transducer
- 40kHz or 70kHz Catch Sensors
- FS PWR/TTM Interface Unit
- USB/RS232 or optional Ethernet/RS232 converters
- FS 70 PC based Processing Unit.
- LCD display monitors.

1.3 Typical System Configurations





1.4 Display Monitor

The display monitor for the FS 70 can be a LCD monitor but any commercially available monitor may be used. This is in order to have the full benefit of high resolution provided by the video Multi-Display adapter available with the FS Processors.

1.5 Processor Unit

The FS 70 19" Rack mounted Industrial Processing unit is the control unit for the system. The rear panel of the Processing unit contains the connectors for AC power, Dual Monitor port, one Serial port and several USB ports, Keyboard, Mouse, Printer, and Network port. The Network Ethernet port can be used to connect the remote workstation or connect with the factory for remote service support.

The installed FS 70 system software provides a mechanism for the sonar head detection, setup and operation. It is operated through the Main Control panel to enable the Sonar selection, tilt, range, gain, cursor, and by moving the mouse pointer over the toolbar will allow the operator to perform certain operations with a simple Right or Left mouse click.

The sector heading and width are also controlled by a single mouse click used to set the center and the width of the sector scan. In polar mode the sector width can be extended up to 360°.

NOTE: A security key or ("dongle") must be attached to a USB port to enable full operation of the system.

1.6 Power /TTM Interface Module

The FS 19" Rack mounted Power/TTM interface Module unit provides the supply voltage required by the trawl sonar and the telemetry translation between the Processing Unit Serial or USB port and the sonar head. The DC output voltage is combined with the telemetry signals and supplied to the trawl sonar.

The voltage and current supplied to the sonar head are monitored by voltage and current meters. A selector switch located below the voltage meter can be used to select the output voltage of the power supply required for the appropriate system configuration. Also, a separate on/off switch is located in the front panel.

NOTE: The main on/off switch input voltage selector and input fuse are located on the rear panel of the TTM Module.

A test cable connector and selection switch between the trawl cable and test cable are accessible on the front panel, providing quick access for a test cable without disconnecting the 3rd wire cable from the rear of the TTM.

1.7 Deployment Housing Unit

The trawl deployment housing unit is made from polyurethane and designed for the harshest of environments yet it is easy to handle. The FS 70 trawl unit sits within the deployment housing unit and contains the vertical sonar head, catch hydrophone receiver, the optional forward hydrophone, the 200 kHz echo sounder transducer and depth and temperature sensors. The mounting kit supplied contains the strain relief cable gland and other hardware used to attach the trawl cable to the trawl head rope.

The trawl cable is connected to the trawl sonar by a watertight connector and a locking sleeve.

1.8 Jointing Tool

Jointing tools and materials are required for splicing the trawl cable and attaching the trawl "2 pin pigtail" connector to the trawl sonar. We recommend using 3M 72-N1 jointing tool kits that can be purchase locally and are designed for coaxial cable with a breaking point of 1500kg. The jointing kit will allow you to make 1 cable joint.

NOTE: The size of the required joining and crimping sleeve will be determined by the type of 3rd wire you are using.

1.9 Catch Sensors

The catch sensor “eggs” are wireless sensors mounted on the cod-end of the trawl net to detect the stretch of the net as it fills up with the catch. When sufficient stretch of the net occurs, the catch sensor is triggered and sends an acoustic signal to the trawl sonar through the catch receiver. The information is then sent to the processor and displayed on the monitor.

The sensors have a rugged construction in order to withstand the strain from winches and the power block. The operator can use up to six sensors (with the 40 kHz system) simultaneously. The catch sensors are equipped with rechargeable batteries.

1.10 PI Sensors Option

The FS 70 provides full integration with the PI System sensors. Door Spread, Net Geometry, Bottom Contact, Rip Sensor and Cod End Depth Sensors available from Simrad AS, Horten Norway.

1.11 Depth, Temperature & Sensors NMEA Output

The FS 70 Processing Unit can be configured to output NMEA data information. The integrated sensor module will output Depth, Temperature and PI Sensors data when interfaced to echo sounders or other onboard equipments. The head rope depth information appears on the sounder showing the location of the trawl in relation to the fish or bottom returns.

1.12 Trawl Cable, Winch and Block

The trawl cable and the associated equipment are supplied by the vessel. The trawl cable is chosen for maximum mechanical strength, durability and minimum attenuation of the signals. Cables in common use are coaxial with breaking points of 1500kg and 6000kg.

Cable winches are delivered in different types and with different capacities; low-pressure hydraulic, high-pressure hydraulic and electrically driven. Choice of winch is dependent on prevailing conditions; type and length of cable and available source of power. Most types operate automatically - the cable is pulled out, kept tight during towing, and hauled in together with the trawl. Control of the winch is done remotely from the bridge.

Any commercially available pulley block may be used to properly align the cable onto the winch. A snatch block has the advantage that it may be installed without having to thread the cable through it. A unit with two movable steering arms (one on each side of the pulley) is recommended to prevent the cable from coming off the pulley and causing damage to the cable.

2 THEORY OF OPERATION

2.1 Introduction

This section explains the theory of operation of the Vertical and Sounder Scanning Trawl Monitoring Sonar System.

2.2 Basic Principles

- Sound waves travel very efficiently through water.
- A sound pulse can be projected through water in a controlled direction with the sonar transducer.
- An object in the path of the projected sound pulse will reflect some sound pulses back toward the sonar transducer.
- The speed of the sound pulse projected through the water can be predicted for given conditions.

2.3 Determining Target Position

The trawl scanning sonar processor measures the time from the start of the sound pulse projected through water, to the reception of the sound pulse reflected back to the sonar transducer. The measured time is then converted to distance by using the value of sound speed through water.

Since the sound pulse is projected in a known direction, the bearing of the reflected object is also known. This makes it possible to locate the object with respect to the sonar transducer; the information will be used to plot the position of the reflected target on a video graphic display monitor.

2.4 Forming an Image

The sound pulse projected will be attenuated as it travels through the water from the transducer to the target and back. Much of this attenuation is a predictable function of the total time or the distance the sound pulse travelled through water. Increasing the receiving gain with time can compensate for this decrease in the signal level. This is done automatically in the sonar with a **Time Varying Gain (TVG)** circuit.

After the TVG correction, the absolute levels of the received signals will be determined by the acoustic response of the reflecting target.

The sonar processor system repeatedly measures the TVG corrected target levels by digitizing a sequence of samples after each sound pulse transmission. Each sample is then plotted on the video display at the appropriate position according to its range and bearing. The level of the target strength sample determines the colour used to plot each sample.

The process can be repeated with the transducer pointed in different directions, forming an image of a large area of the bottom, (or the trawl net geometry) and displaying it on the video screen.

In simple words, the TVG function controls the gain of the receiver so that a school with a given size and density is presented with approximately the same strength on the display, inside the regulated TVG range.

2.5 Key Features Setting

The following paragraph will explain some of the key features of the FS 70 System.

2.5.1 Automatic Gain Control (AGC)

The **AGC "**Automatic Gain Control" algorithm increases the gain during low acoustic returns and reduces the gain during strong acoustic returns. The speed with which the gain is adjusted is determined by the setting of the "RX Gain Response"

2.5.2 Reverberation Controlled Gain (RCG)

The **RCG** filter senses the noise level (reverberation, propeller noise, etc.), and adjusts the gain of each of the received beams in order to eliminate noise on the display. The strength of the filter can be selected in the menu. With maximum strength selected, the RCG will effectively reduce the bottom in shallow water, while variation on the bottom will be displayed.

Note that scattered fish can be perceived as reverberation. The RCG filter must be used with care if scattered schools are to be detected.

2.5.3 RX Gain Response and Type

The setting of the "RX Gain Response" determines the response of the filter algorithm as selected by the "RX Gain Type". For the AGC, this setting determines the speed by which the gain is adjusted. For the RCG, this setting determines the influence of the previous ping average over the current ping. If set to "Slow" the overall average is given by the sum of 20% current and 80% of previous average. In "Medium" this ratio is 50% to 50%, and in "Fast" the ratio is 80% to 20%.

2.5.4 Pulse Length Control

The FS 70 Trawl Sonar Heads are capable of changing the acoustic pulse length that is transmitted. The surface processing unit sets the pulse length based on the operating range of the sonar head. It is generally better to use a longer pulse as the operating range increases. However, the actual value can be optimized to enhance the details in the sonar image (Optimize Resolution) or to increase the target visibility at long distance away from the sonar head (Maximum Range).

Optimize Resolution - The pulse length selection can be optimized to enhance the detail of the targets. It has been experimentally determined that the pulse length corresponding to 40% of the sample period can increase the image resolution and details for targets that are generally larger than a few samples.

Maximize Range - The pulse length calculation can be optimized to increase the detection range of the sonar head. Generally, the longer the pulse length, the more energy is transmitted into the water which could then travel a longer distance and get reflected from the targets that are further away from the sonar head. It has been determined that the pulse length corresponding to 80% of the sample period can increase the detection distance of the targets without a major drain on the sonar head power supply.

The pulse length increases linearly with increasing operating range. The system will automatically set the pulse length to match the range, unless manually adjusted by the operator.

2.5.5 Peak Detection

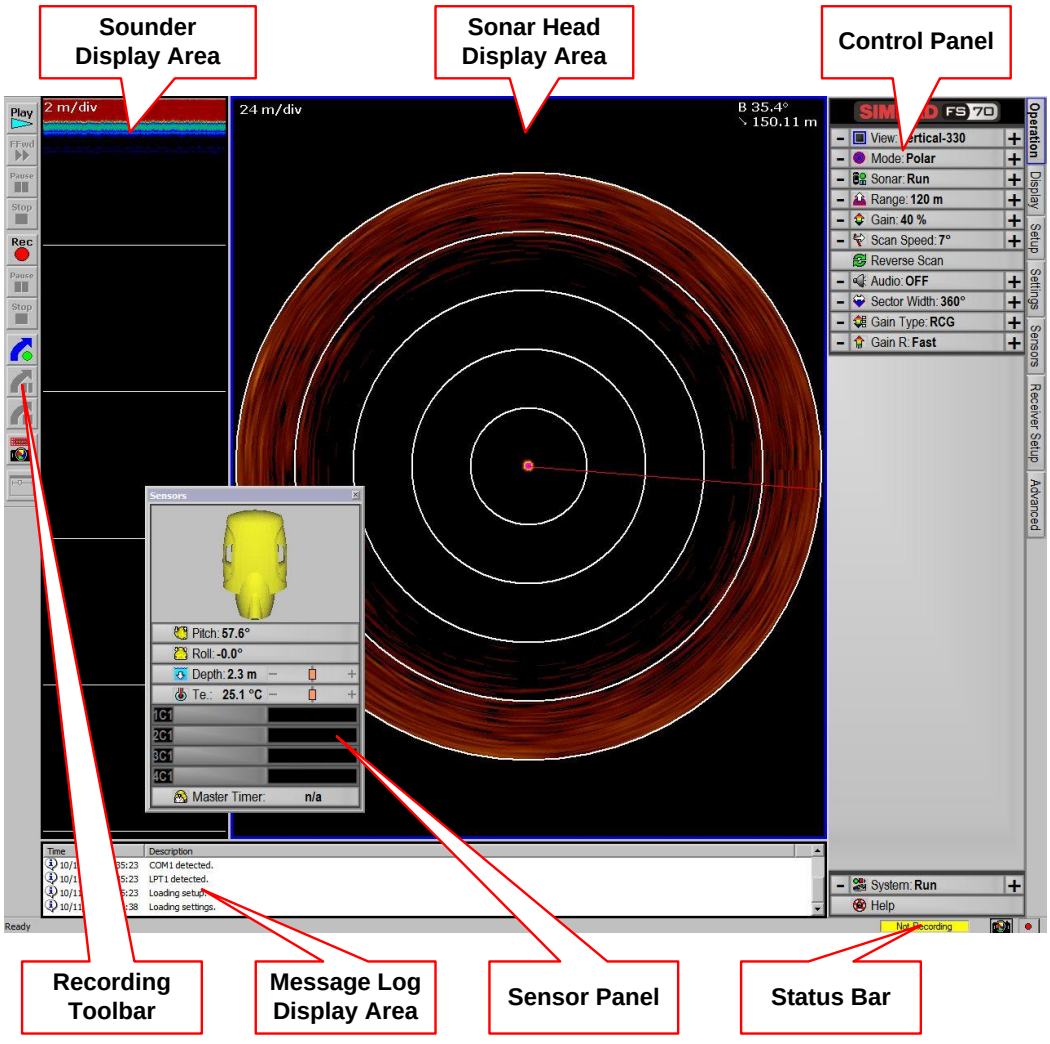
Depending on the operational settings, the combination of small target size, short pulse length and long sample period could result in the acoustic return from the target falling between two samples and therefore not beings seen on the sonar image.

To remedy this, it was decided to take additional samples in the interval between two displayed samples and select the strongest echo target during that interval for the sonar image display. This is generally referred to as Peak Detection because we are detecting the peak value of signal in between two samples. The user can enable the Peak Detection and select the number of additional samples that the system takes in order to detect the peak value in order to optimize the detail in the image while maintaining an acceptable signal to noise ratio.

3 FS 70 SYSTEM OPERATION

3.1 Introduction

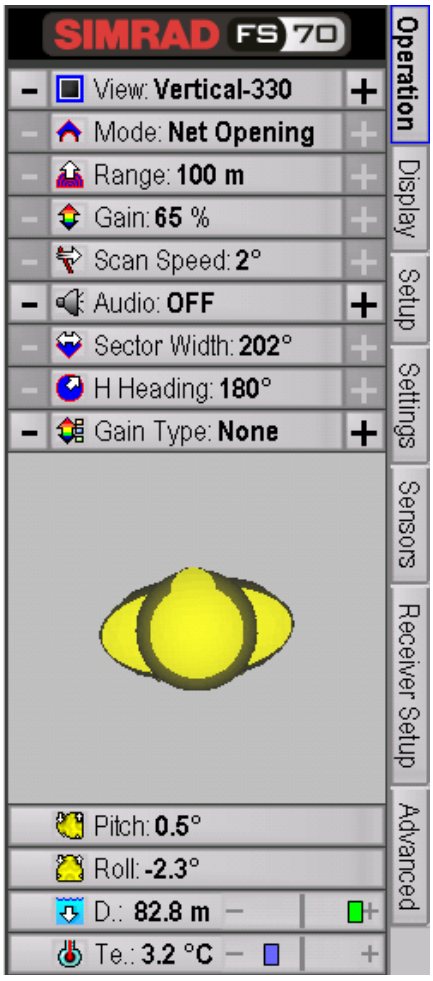
The typical screen display for FS 70 Sonar Processor consists of a tabbed Control Panel that allows changing the settings and operating parameters of the FS70 System, resizable display areas for the Sonar Head, Sounder and Message Log, a floating dockable Sensor Panel to monitor the sensors status, toolbars for quick access to various functionalities and a status bar to monitor the system status. The image below shows a typical screen layout for the FS70 processor and highlights the main components listed above:



This chapter describes the navigation through the menu system and explains the adjustments to the menu settings that may be made to control the sonar operation

3.2 Control Panel

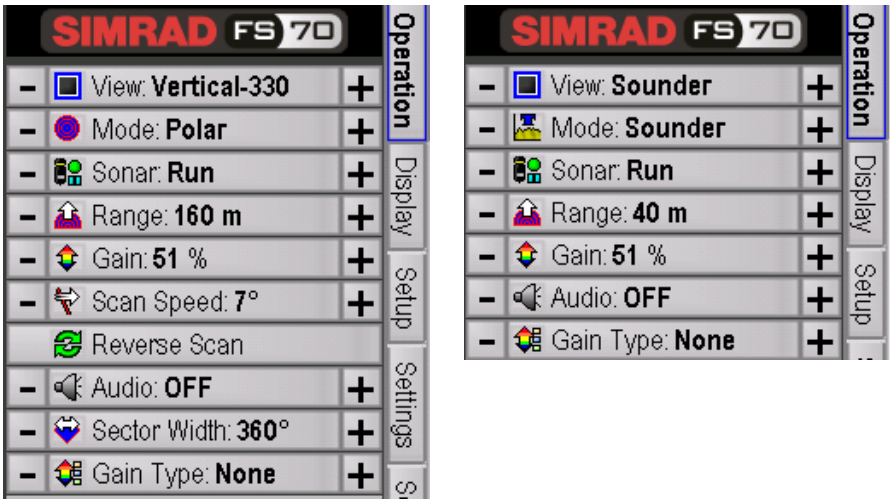
The Control Panel allows adjustments to several system parameters without having to access a menu system. To minimize clutter the control items available Control Panel are grouped into tabbed pages according to functionality. Items that lead to dialog boxes are shown in the "Advanced Menu". All other items are system parameters that may be modified. As you move the pointer over the Control Panel, a simple help message will pop up beside the pointer describing its function. To perform certain operations, just left or right click the mouse over the desired item. Selected items are highlighted.



The Sonar Control Panel located above is divided into 7 tabbed Pages: Page 1 “Operation”, Page 2 “Display”, Page 3 “Setup”, Page 4 “Settings”, Page 5 “Sensors Control”, Page 6 “Receiver Setup” and Page 7 “Advanced”. Each page allows you to change the system parameters. To change the value of a system parameter, move the mouse up or down until the desired button is highlighted and click the left mouse button or right mouse button to activate the new setting.

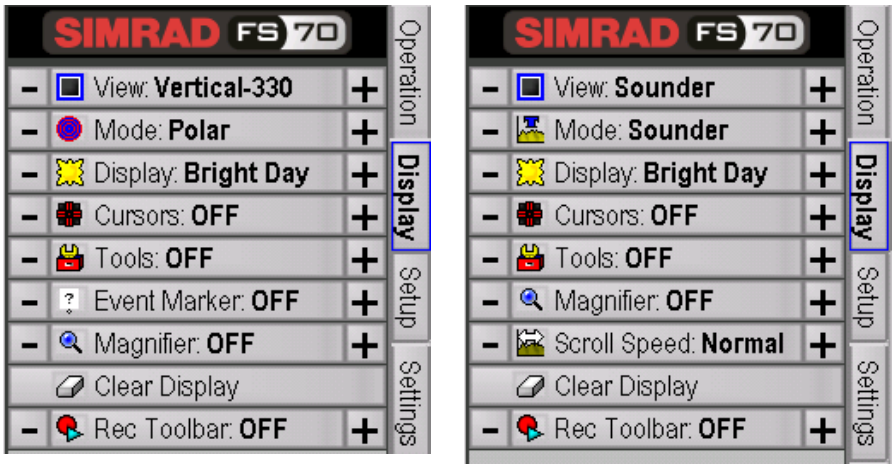
NOTE: The main control panel can be docked or auto-hidden.

3.2.1 Operating Control Panel Page



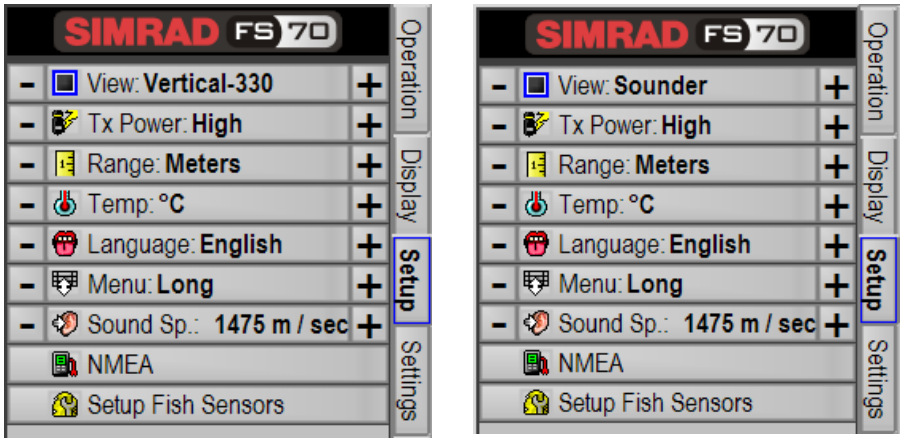
The main “Operating” control panel allows you to select operational settings for the active sonar. Click on the appropriate display window to activate the sonar you want to control, next position the mouse cursor on the button you want to change, then, click the left mouse button or right mouse button to change the settings.

3.2.2 Display Control Panel Page



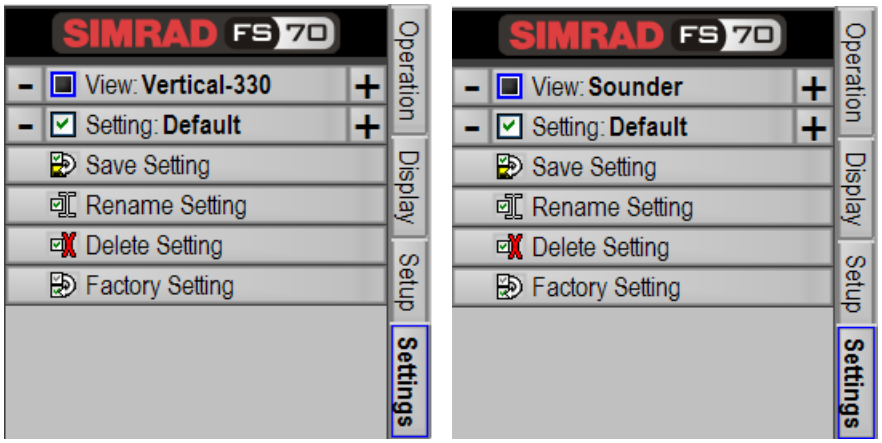
The main Display" control panel allows you to select the display settings for the active sonar. To change the value of the system parameter just left or right click the mouse over the button you have selected, move the mouse up or down until the desired button is highlighted and click the left mouse button or right mouse button to activate the new setting.

3.2.3 Setup Control Panel Page



The main “Setup” control panel allows you to set up system parameters for the active sonar. To change the value of the system parameter just left or right click the mouse over the button you have selected, move the mouse up or down until the desired button is highlighted and click the left mouse button or right mouse button to activate the new setting.

3.2.4 Users Settings Control Panel Page

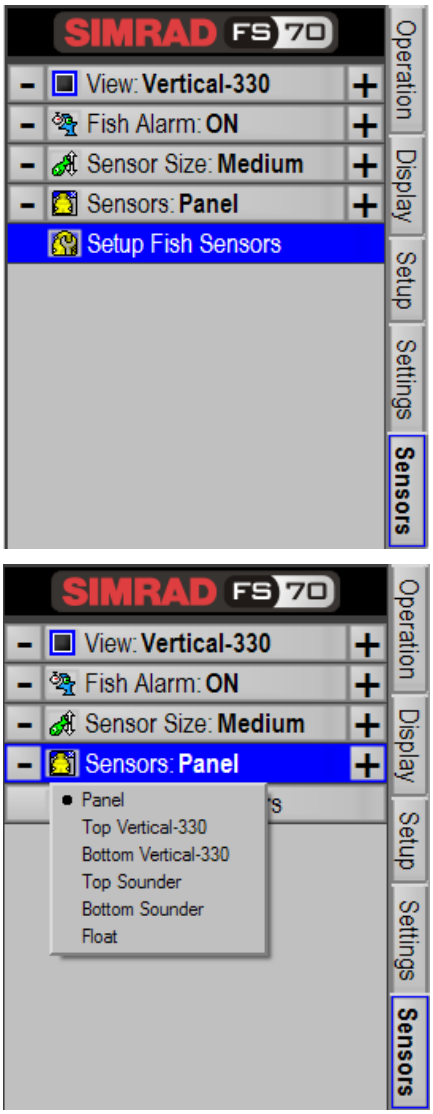


The main “Users” control panel allows you to set the settings for the active sonar based on previously saved settings. To change the setting, just left or right click the mouse over the button you have selected, move the mouse up or down until the desired button is highlighted and click the left mouse button or right mouse button to activate the new setting.

NOTE: When you “Save Setting” you automatically save the setting for both the vertical and the sounder at the same time.

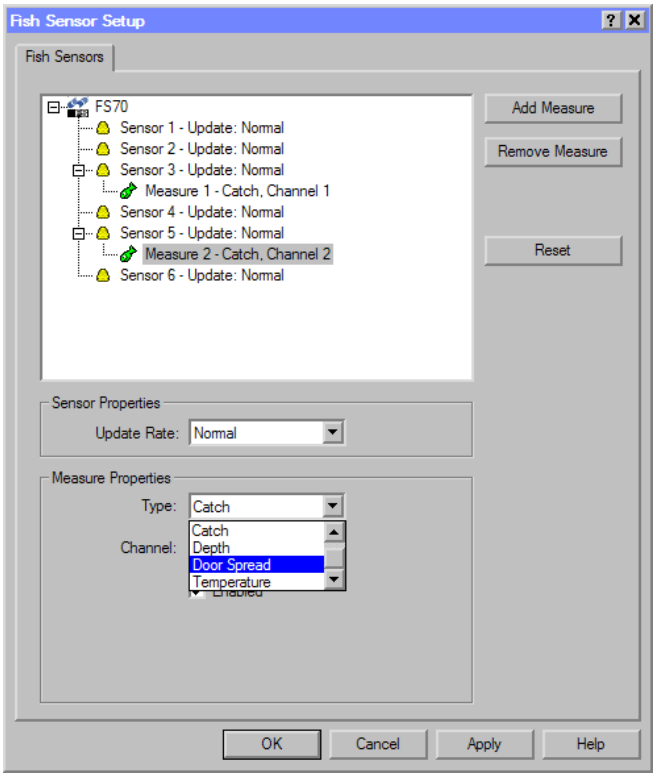
3.2.5 Sensors Control Panel Page

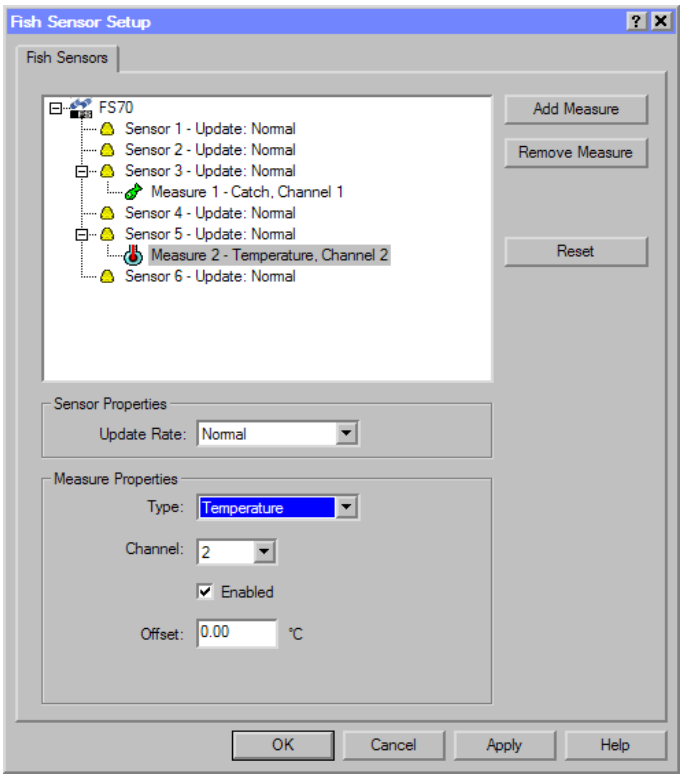
The main “SENSORS” control panel allows you to select the sensors you want to setup. To change the value of the system parameter just left or right click the mouse over the button you have selected, move the mouse up or down until the desired button is highlighted and click the left mouse button or right mouse button to activate the new setting.



By placing the mouse cursor on the "Setup Fish Sensors" button and then left clicking the mouse, the Fish Sensor Window will pop up as indicated on the following page. Move the mouse cursor up or down to select the sensor you want to select and then left click the mouse on the appropriate selection to activate the mode of operation. By placing the mouse cursor on the "Sensors Panel" button and then right clicking the mouse a drop down menu will appear. Move the mouse cursor up or down to select the location of the sensor panel you want to select. Next left click the mouse on the appropriate button selection to activate the operation.

3.2.5.1 PI 40 kHz Channel Sensors Setup





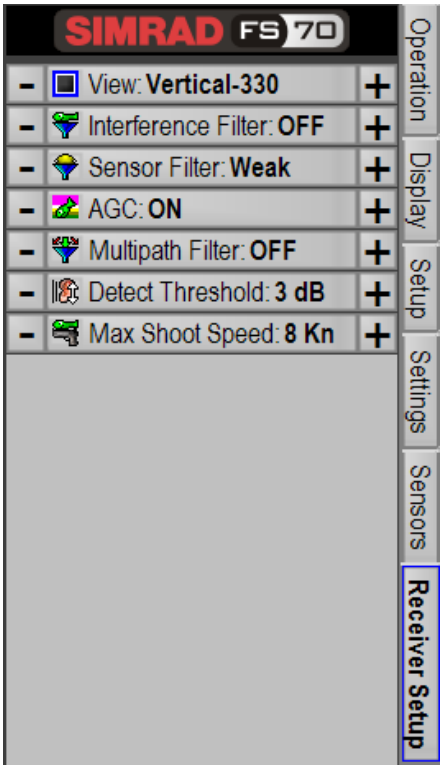
The next step after the above operation, for example, will be to add a catch sensor.

Click on “sensor 5”; next select Door Spread or catch #2; next you would select the channel of operation, in this case you would have selected #2.

If you are adding for example a temperature sensor you can setup an offset. See the windows above for the example.

Note: For additional information on the Simrad PI Setup, please refer to your PI Instruction Manual.

3.2.6 PI 40 kHz Sensors Receiver Setup



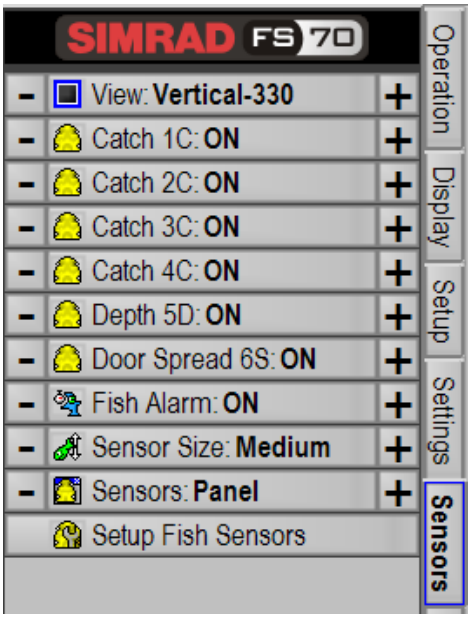
The main “SENSORS RECEIVER SETUP” control panel allows you to select the sensors you want to setup. To change the value of the system parameter just left or right click the mouse over the button you have selected, move the mouse up or down until the desired button is highlighted and click the left mouse button or right mouse button to activate the new setting.

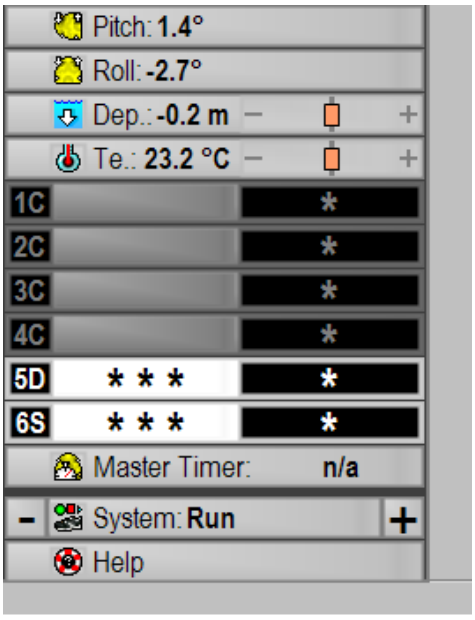
NOTE: For additional information on the Simrad PI Sensors Setup, please refer to your PI Instruction Manual.

NOTE: The PI sensor setup menus are not available if you are using a 70 kHz Catch Sensors system.

3.2.7 PI 40 kHz Sensors Activation Menu

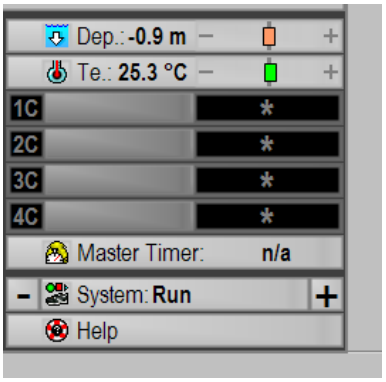
The main "SENSORS ACTIVATION MENU" control panel allows you to select the sensors you want to turn ON or OFF. To change the value of the system parameter just left or right click the mouse over the button you have selected, move the mouse up or down until the desired button is highlighted and click the left mouse button or right mouse button to activate the new setting.

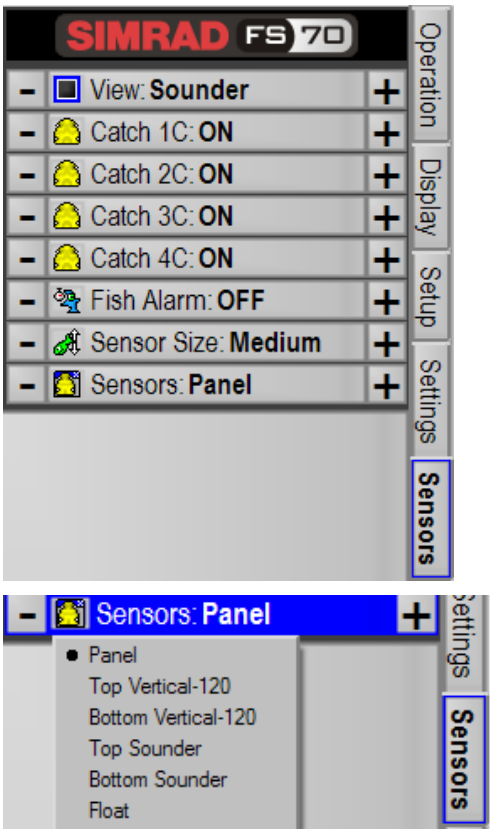




NOTE: The PI sensor setup menus are not available if you are using a 70 kHz Catch Sensors system. Refer to the following section for the 70 kHz Catch Sensors activation setup.

3.2.8 PI 70 kHz Sensors Activation Menu



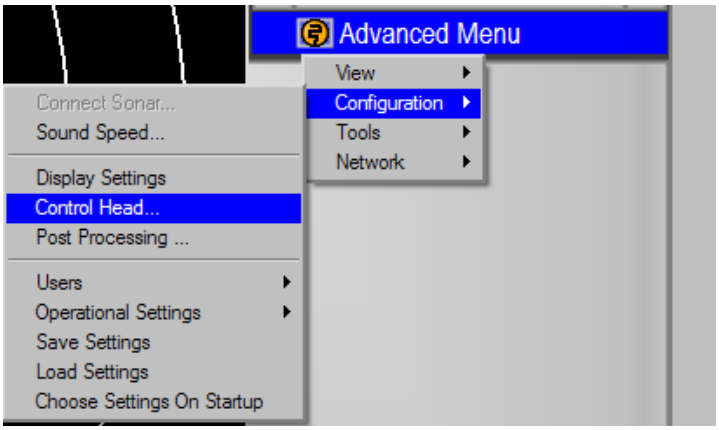


The Catch Sensor windows will be displayed automatically when you left click on the Catch Window button located on the Sensors Page. To activate or de-activate individual Catch Sensors click on the appropriate button.

When you activate a Catch Sensor the sensor information is automatically displayed in the Control Panel.

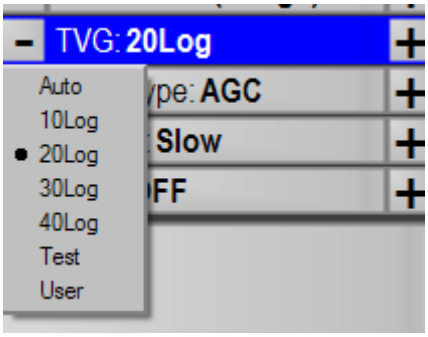
3.2.9 Advanced Panel Page

The main "Advanced" control panel allows you to select the sonar you want to control. To change the value of the system parameter just left or right click the mouse over the button you have selected, move the mouse up or down until the desired button is highlighted and click the left mouse button or right mouse button to activate the new setting.



3.2.10 Advanced Operation TVG Mode

Example of some of the controls located in the Advance panel



By placing the mouse cursor on the mode button and then right clicking the mouse a drop down menu will appear. Move the mouse cursor up or down to select the TVG mode of operation you want to select and then left click the mouse on the appropriate TVG selection to activate the mode of operation.

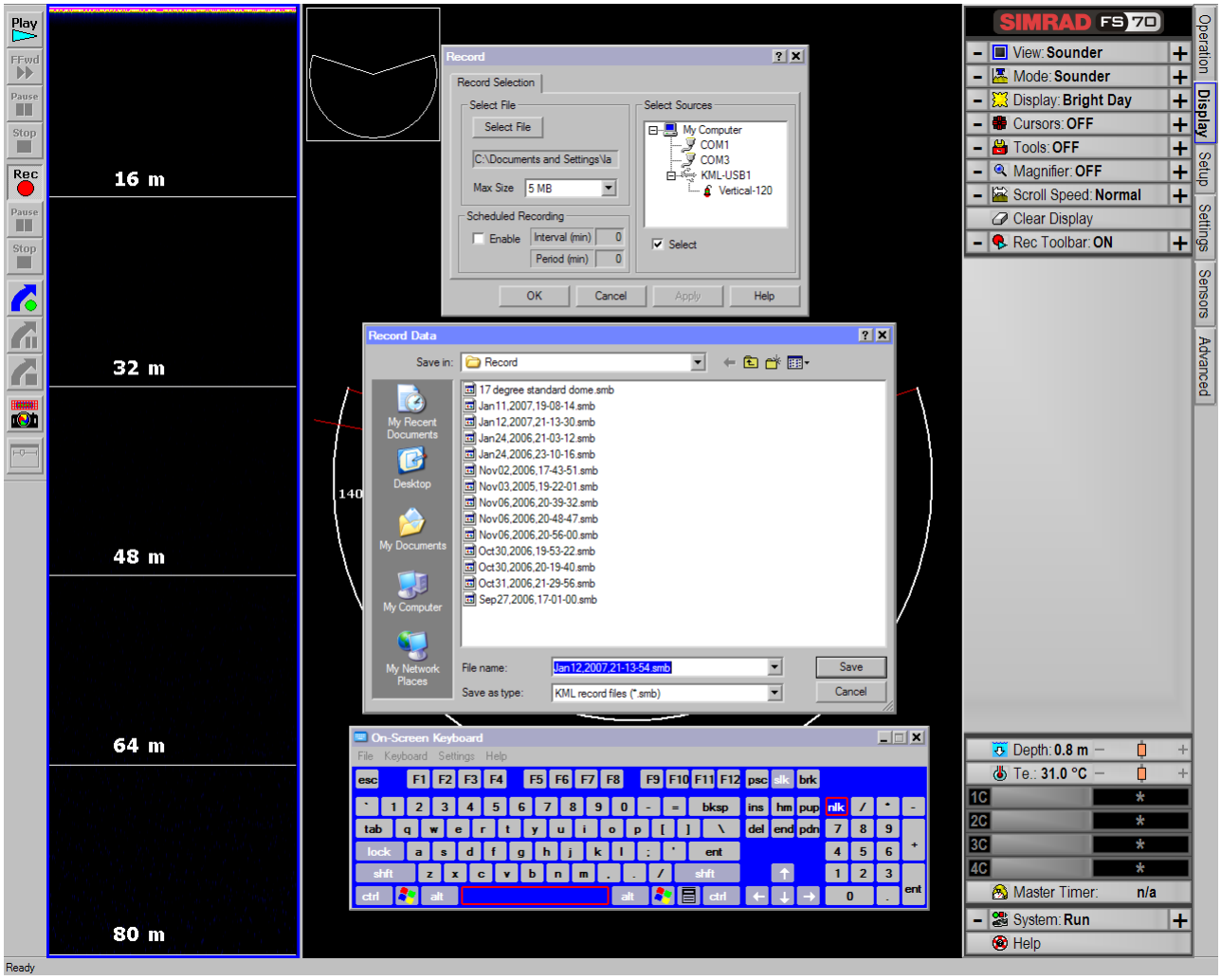
3.2.11 Display Recording Toolbar

Place the mouse cursor on the Record “REC” Toolbar button, and then right click the mouse to enable the Record Toolbar ON or OFF.

The Toolbar will automatically pop-up on the left side of the screen. Move the mouse cursor up or down to select the RECORD mode of operation you want then left click the mouse to activate the recording.

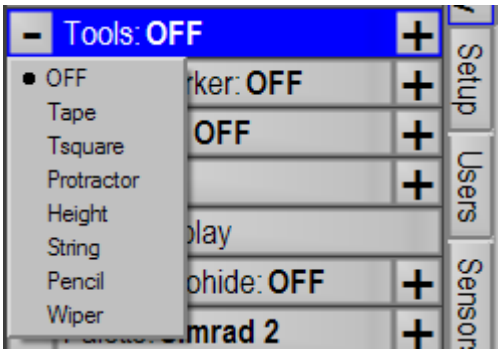
3.2.12 Record Selection

When the RECORD mode is activated the following windows will appear. Click on the "Select File" and type the name of the file you want to record. Next click OK.



3.3 Display Tools Selection

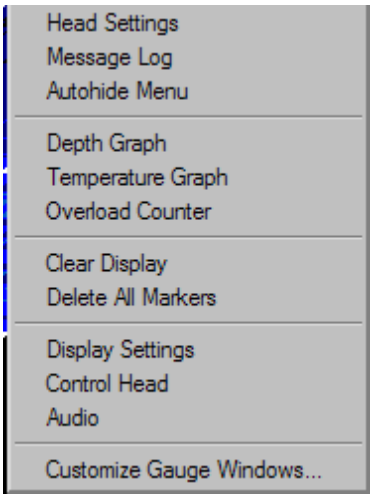
By placing the mouse cursor on the TOOLS button and then right clicking the mouse, a drop down menu will appear. Move the mouse cursor up or down to select the TOOL of operation you want to select.



Next left click the mouse on the appropriate TOOL selection to activate the operation.

3.4 Depths and Temperature Graphs

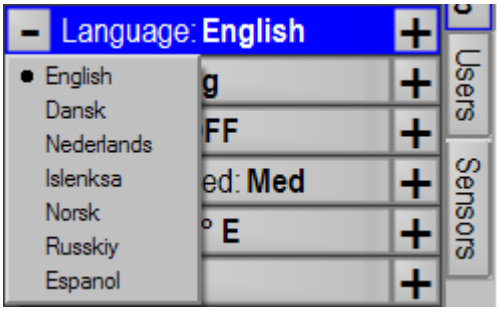
To activate the Depth or the Temperature graphs you must right click the mouse on the center of the sonar image. The following menu will pop-up. Move the mouse pointer up or down and then left click the mouse button to display the appropriate window



NOTE: Additional information from the above menu can also be displayed.

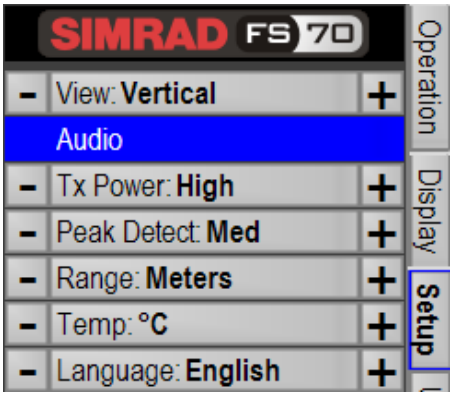
3.5 Language Selection

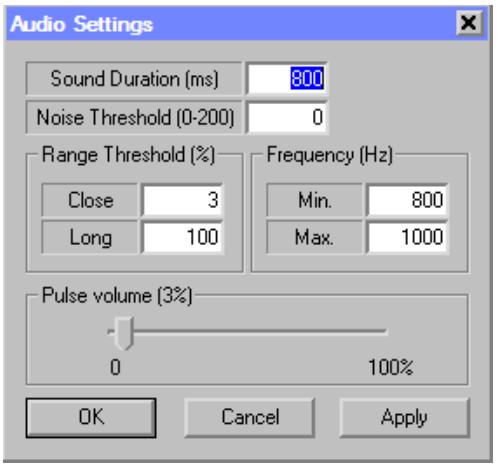
By placing the mouse cursor on the Language button and then right clicking the mouse a drop down menu will appear.



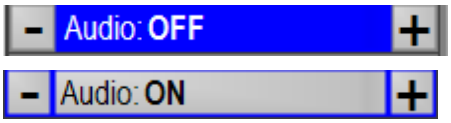
Move the mouse cursor up or down to select the language of operation you want to select and then left click the mouse on the appropriate selection to activate the language of operation.

3.6 Audio Set-up



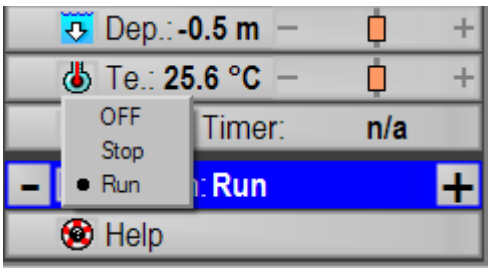


Right Click on the "AUDIO" button located in the SETUP Page to open the Audio Settings dialog window. After you have completed your changes click "Apply". If you are satisfied with your selection Click "OK"



Next, go to the "Operation Page" to turn OFF or ON the Audio.

3.7 Activating the Sonar



When you click on the Run button the system will initialize the serial port. and start the calibration of each sonar head connected to the TTM module. When you click the Stop button you will automatically disconnect the sonar heads from the system.

NOTE: If you only want to "PAUSE" the sonar image, just right click the mouse on the Sonar "Run/PAUSE" Button located on the Operation Page. Left click the mouse to "RUN" the system.

4 FS 70 INSTALLATION INSTRUCTIONS

4.1 Installation procedure

The installation of the FS 70 Trawl Monitoring System involves the following steps:

- Deciding on the locations in the wheel house for the surface units.
- Mounting the surface units and making the connections between the FS 70 Processor, the display unit, the FS Power Supply/TTM interface unit, and other optional equipment being installed.
- Assembling the trawl unit.
- Running up the system on the test cable to verify proper installation, configuring the control unit, and performing initial system tests.
- Installing the cable winch, snatch block and trawl cable, and connecting the winch slip-rings to the control unit.
- Mounting the trawl unit to the head rope and completing the final system test.
- Mounting the catch sensors to the cod-end of the trawl and other PI sensors.

4.2 Surface Unit Installation

4.2.1 Mounting of Units

If you have selected the FS Integrated Rack Mounted System, you can install the cabinet up to 30 meters from the monitors. With a KVM extender option you can install the cabinet up to 150 meters away from the monitors. If not, you will have to follow the procedure indicated below.

The display unit should be located in the wheel house in a place that provides a good view of the screen and avoids direct sunlight if possible. Depending on the monitor that was selected the unit may be mounted on top or recessed into the bridge console. Simrad supplied display units include the necessary mounting brackets.

If you have not selected the Rack Mounted System, the FS 70 Processing unit should be mounted in close vicinity to the operator's position in the wheel house and near the display unit. The unit may be mounted on top of the bridge console or recessed into a cabinet. Note: You must have access to the ON/OFF switch and provide proper ventilation to avoid overheating.

The Power Supply/TTM Interface Unit supplied with the system may be mounted on top of the bridge console or recessed and flush mounted into the bridge console. Sufficient space should be left around the control unit for proper ventilation.

Optional equipment for interface to the control unit may be mounted in any convenient location provided the user supplied interconnects cables is of sufficient length and the required power is available.

NOTE: The Processing Unit and the Power/TTM must be connected to a dedicated UPS.

4.2.2 Ship Power Requirement

The display unit, generally, will require 120 VAC or 230 VAC. Depending on the capabilities of the unit chosen, it may automatically detect the supply voltage or the unit may have to be ordered for the correct voltage.

The FS 70 Processor will operate from either 120 VAC or 230 VAC. IF input voltage must be selected then a voltage input selector switch is located at the rear of the unit. Some of the processors are equipped with auto detection voltage input.

The FS Power Supply/TTM module can be operated with either 120 VAC or 230 VAC. Selection of the supply voltage is done by moving the voltage selector card located in the power entry module at the rear panel. Details on selecting the proper voltage are indicated on the voltage card. You must position the “indicator pin” location to the desired voltage.

To change the input line voltage, use a small blade screwdriver and pop the cover. Pull the voltage selector card straight out from the housing, and place the indicator pin to the selected voltage. Reinsert the card, reinstall the cover and verify that the indicator shows the desired voltage. You must insure that the proper fuse rating is installed, 2 A for 230 VAC and 4 A for 110 VAC. Spare fuses are supplied with the TTM module.

NOTE: Failure to select the proper input voltage will damage the internal power supply.

4.2.3 Display Unit

Either an LCD/DVI or VGA monitor may be connected to the FS 70 Processor. Depending on which type of monitor is used, the video output type must be set accordingly.

An industry standard VGA monitor will connect directly to the miniature DB-15 connector located on the rear panel of the processor unit.

The FS 70 Processor Unit has a Dual NVIDIA Quadro Video interface card installed as standard equipment. You must set up your display software as per your requirement. If you have only one monitor, simply plug your monitor cable into the monitor **"Y"** adaptor connector marked "Connector 1" on the adapter card. If you are using two monitors, you must connect the 2nd monitor to the "Connector 2" on the adapter card.

NOTE: The FS 70 Processor must be is turned "OFF" prior to connecting the video monitors

A User Guide manual is provided with the system including a Recovery CD-ROM. With this CD you can recover your system as delivered and run the diagnostics.

NOTE: The Dual NVIDIA software is installed at the factory, you only have to set up your monitor configuration as per "Microsoft Window's Operating System" provided with the FS processor unit.

4.2.4 Power/TTM Unit

The Power/TTM Interface comes with the long line power supply incorporated in one unit, thus making the installation easier.

The Front Panel comes with an ON/Off switch, trawl DC output voltage meter, amperage meter and a four position trawl voltage rotary selection switch. The possible selections are; "OFF", "TEST", "120 V" and "200 V". A "TEST/TRAWL" selector switch and test cable connector is also provided in the front panel.

The Rear Panel of the Power/TTM Interface comes with 110/230 VAC power input, master ON/OFF switch and fuse located in the AC power entry module, and RS232 serial ports "A", "B" and "C" including the 3rd wire trawl cable connector.

4.2.5 Connecting the Processing Unit

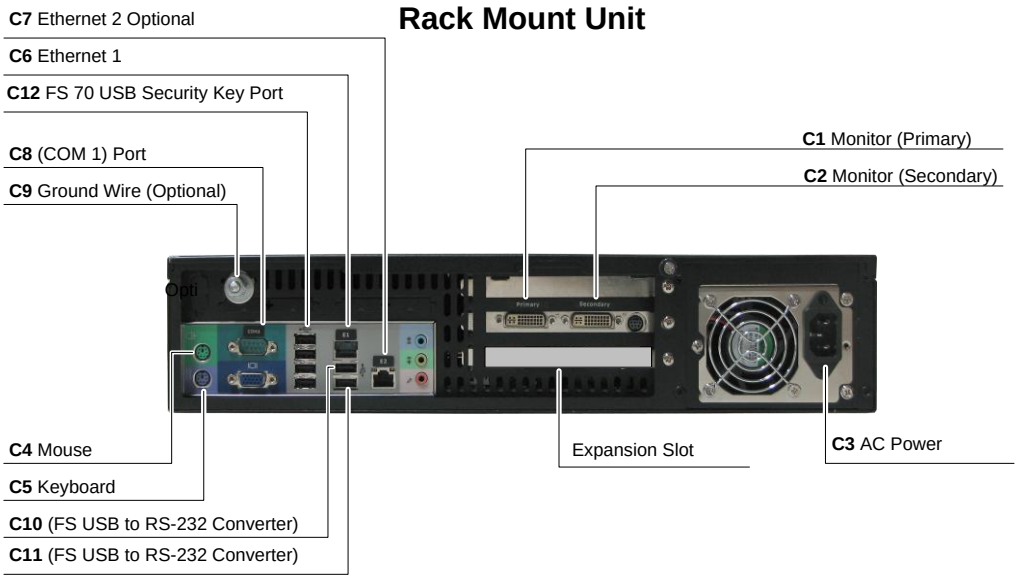
The FS 70 Processor unit comes with the FS 70 Trawl Sonar System operating software installed by the factory.

NOTE: All Device drivers and utilities are preloaded on your system and provided on a Driver, Utilities and documentation CD-ROM. This CD-ROM also includes tips for re-installing the operating system.

If you have not selected the Rack Integrated Mounted System, mount the FS Processing unit with easily accessible power outlet and enough space for the display, keyboard, mouse, TTM module, and any other accessories. The connectors are shaped to go in one way only.

For additional information, please refer to the User's Guide supplied with the system.

FS 70 Industrial Processing Rack Mount Unit



4.2.6 Interconnect Cables Description

ID #	Application	Description
C1	Video Connection	Standard Video cable supplied with monitor
C2	Video Connection	Standard Video cable supplied with monitor
C3	AC Power Input	Standard 110/230Vac cable supplied with the processor
C4	PS2 Mouse	Logitech Trackman Trackball-STOMouse
C5	PS2 Keyboard	Mini Cherry Keyboard
C6	Ethernet 1 Connection	Cat 5 RJ45 Ethernet cable “Optional”
C7	Ethernet 2 Connection	Cat 5 RJ45 Ethernet cable “Optional”
C8	RS232 Com Port	RS 232 Cable not supplied “Optional”
C9	Ground Wire Connection	Ground wire Cable not supplied “Optional”
C10	FS 70 USB Port	Connection for USB/RS232 Converter
C11	FS 70 USB Port	Connection for USB/RS232 Converter
C12	FS 70 USB Port	Connection for USB FS 70 Security Key

4.2.7 Connection the USB Security Key “Dongle”

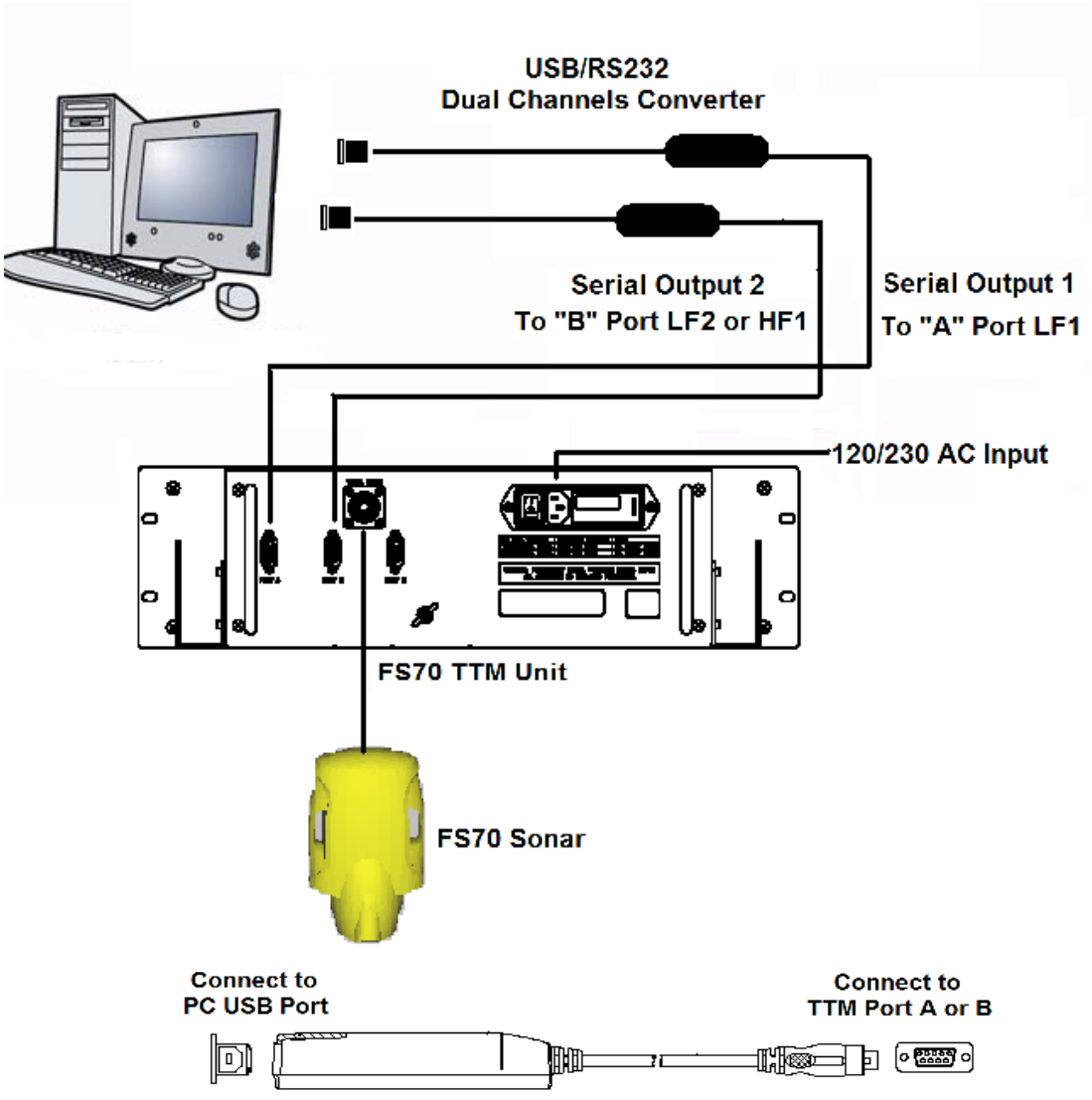
The security key “USB Dongle” is require to run the FS 70 host software and must be connect the to a USB port located at the rear of the processing Unit. Connect the key as indicated in the above DWG located in paragraph 4.2.5.

NOTE: The security key “Dongle” is NOT a “Flash Memory USB” stick.

4.2.8 Connecting the USB/RS232 to the TTM Unit

Connect the 2 meter USB cable to the USB/RS232 Converter; next connect the USB side of the converter to one of the USB ports located on the PC and the RS232 connector to the Port "A" of the TTM unit. Note: The Port "A" of all TTM units is assigned for the Vertical Sonar Head, referred as "LF1" telemetry. Port "B" is assigned to "LF2" telemetry required for the forward looking sonar or may be assigned to the "HF1" telemetry required to run the FS70 Sim-Sounder option. If you do have a TTM with the LF2 or HF1 connect the 2nd USB/RS232 as indicated below.

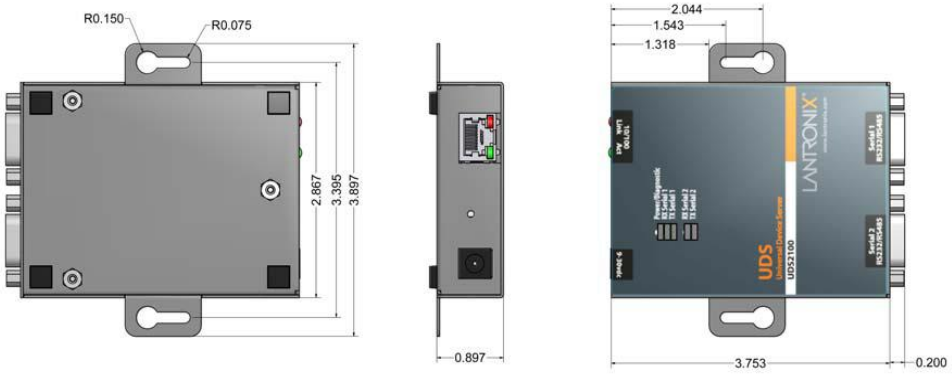
Refer to the DWG below for all connections:



USB/RS232 Dual Channels Telemetry Converter part number 901-80010000

4.2.9 Optional Ethernet Server Device Specification

Your FS 70 Processing Unit **may** come equipped with an optional Network LAN interface adapter. The LAN Ethernet Server Devise adapter provides two (2) RS232 ports. Both ports support 10Mbit/s and 100Mbit/s operations and automatically detect which network type is being used. The RJ-45 plugs into your FS 70 workstation. LAN cables supplied with the system.



The following LEDs are on the top of the UDS2100:

- Power / Diagnostic (Blue)
- RX Serial 1 Activity LED (Green)
- TX Serial 1 Activity LED (Yellow)
- RX Serial 2 Activity LED (Green)
- TX Serial 2 Activity LED (Yellow)

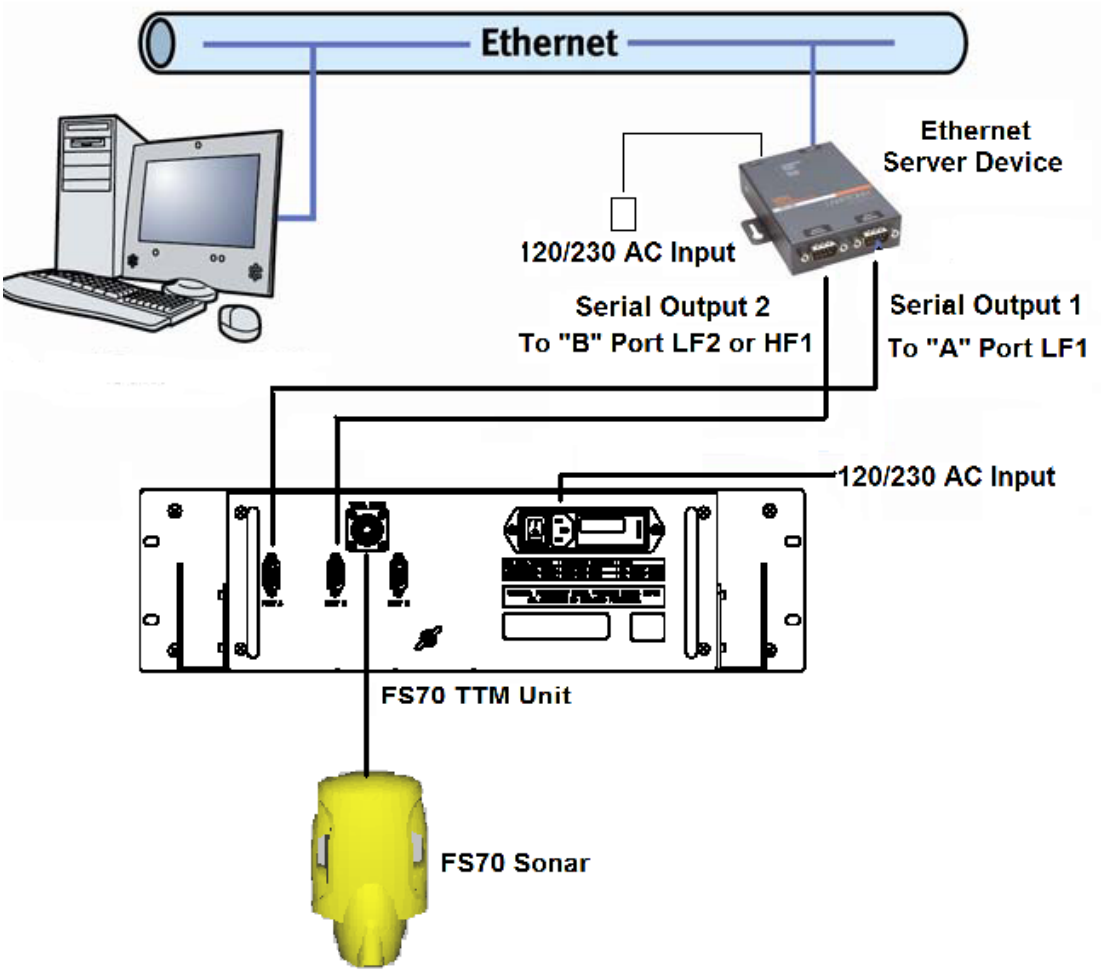
The following LEDs are on the RJ45 Ethernet connector:

- Ethernet Link LED on the left (Bi-color, 10Mbps = Yellow, 100 Mbps = Green)
- Ethernet Activities LED on the right (Bi-color, Half Duplex = Yellow, Full Duplex = Green)

4.2.10 Connecting the Optional Ethernet Server Device to the TTM Unit

Connect the supplied 3 meter LAN Ethernet cable from Ethernet server device to the Ethernet RJ-45 port located at the rear of the PC, next connect the supplied null modem cable from the Serial Output 1 of the Ethernet server device to the Port "A" of the TTM unit. Note: The Port "A" of all TTM units is assigned for the Vertical Sonar Head, referred as LF1 telemetry. Port "B" is assigned to "LF2" telemetry required for the forward looking sonar or may be assigned to the "HF1" telemetry required to run the FS70 sim-sounder option. If you do have a TTM with the LF2 or HF1 connect the 2nd serial output as indicated below.

Refer to the DWG below for all connections.



4.2.11 Connecting a GPS

The GPS NMEA 183 output can be connected to the serial port at the rear of the processing unit. The interconnect cable is not supplied.

The pin connections for your GPS input/output PC/RS232 are as follows:

Pin number “2” - 232 Rx,

Pin number “3” - 232 Tx,

Pin number “5” - GND.

4.2.12 Connecting a Echo Sounder

The FS 70 Processor Unit may be connected to an echo sounder for display of the trawl unit depth on the sounder. This is made via the RS232 serial port on the rear panel of the processing unit or an RS232/USB converter. The processor will output the Temperature and the Depth from the trawl integrated sensor module in the NMEA 0183 format.

If port “B” is not available you will have to install an additional serial card or install an RS232/USB external converter.

4.2.13 Connecting a Heading Sensor

If you need to connect a heading sensor output to the serial port at the rear of the processing unit, you will have to install an additional serial card in the Processing Unit or install an RS232/USB external converter. The pinout for your heading sensor input/output RS232 connection is as follows:

Pin number “2” 232 Rx,

Pin number “3” 232 Tx,

Pin number “5” GND.

For additional information, please refer to the User’s Guide supplied with the system.

4.2.14 Connection to Cable Winch/Slip-Rings

The connection between the FS TTM Interface unit and the cable winch/slip-rings should be made with a 12AWG or heavier, shielded pair cable. The connection to the control unit is made using the 3-pin MS connector supplied in the TTM module accessory kit. To minimize noise interference on the cable, the shield of the cable should be attached to the connector.

NOTES:

1. **The shield of the cable between the FS TTM module and the slip-rings should be connected at the TTM module, but NOT at the slip-rings.**
2. **Based on experience from previous installations, good results were achieved using a section of your 3rd wire cable for this connection.**

4.2.15 Assembling of the Trawl Unit

Assembling the trawl unit for the first time should be conducted in the wheel house where the surface unit electronics have been mounted. This will facilitate testing the trawl unit using the test cable.

4.2.16 FS 70 Configuration

The FS 70 trawl configurations all consist of an FS 70, 120 kHz or 330 kHz vertical sonar head with a 200 kHz echo sounder, an FS 70 sensor module is integrated in the trawl sonar head. The FS 70 polyurethane housing includes mounting and assembling hardware and a strain relief. The trawl unit also contains a catch receiver unit and the echo sounder transducer. Assembly of the unit involves correctly locating the sonar head, attaching the strain relief to the trawl cable, proper routing and connection of the cable to the sonar head and bolting the polyurethane housing together. This section describes the connection and location of the sonar head, echo sounder transducer and catch receive transducer. Final assembly is illustrated in the “Drawings” section.

A locating block located at the end of the housing or a guide bracket is used to prevent the sonar head from rotating. Only one guide block is required and it can be placed into the positioning hole of the bottom half of the trawl unit housing as shown in the assembly drawing in Chapter 6.

NOTE: Dow Corning "#55" grease must be applied to all mating surfaces of underwater connectors to insure proper sealing. Sufficient grease should be applied so that excess squeezes out with any air when the connectors are mated. RTV or any other sealant must NOT be used, and when tightening the locking sleeves, do NOT use a wrench or pliers!

4.3 System Set-up and Testing using the test cable

Initial power-up, set-up and test of the system should be made with the trawl unit connected to the PWR/TTM module using the supplied test cable. The 3-pin MS connector of the test cable is attached to the connector labelled "TEST CABLE" located on the front panel of the PWR/TTM unit. The other end of the test cable is plugged into the 2-pin connector on the sonar head of the trawl unit.

4.3.1 FS Processor & TTM Communication set-Up

The commnunication between the FS Processor and the TTM unit can be achive 3 ways depending on the type of communication ports available in the processor unit:

1. If standard serial COM ports are available you may use a RS232 Null Modem cable, KML part number 144-0217, supplied with the processor.
2. If USB ports are available then use the USB/RS232 telemetry converter, KML part number 901-80010000, supplied with the processor.
3. If the Ethernet port is desirable for communication then the Ethernet/RS232 Server kit, KML part number 422-42140000, **can be purchased as an option.**

4.3.2 Optional Ethernet Processor System Set-Up

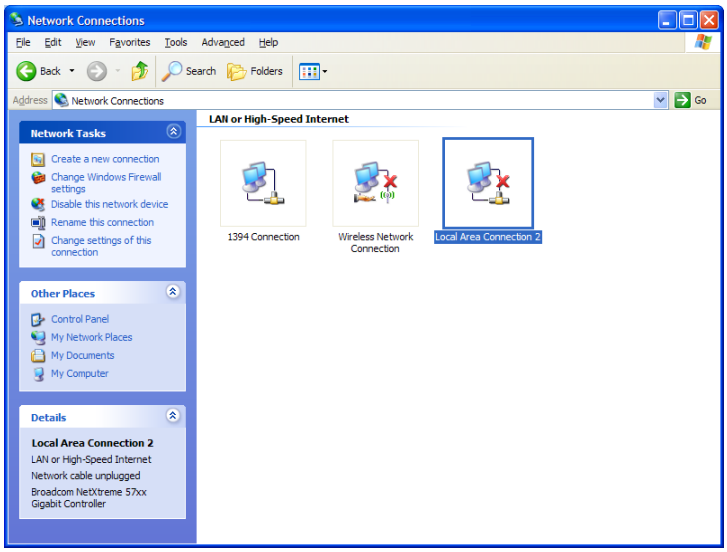
Setting up your surface Window Processor to communicate with the Ethernet converter, static **"IP"** addresses and "**Subnet Mask"** are used to communicate between the processor and the Ethernet converter.

- IP Adress: 192.168.000.XX
- Subnet Mask: 255.255.255.00

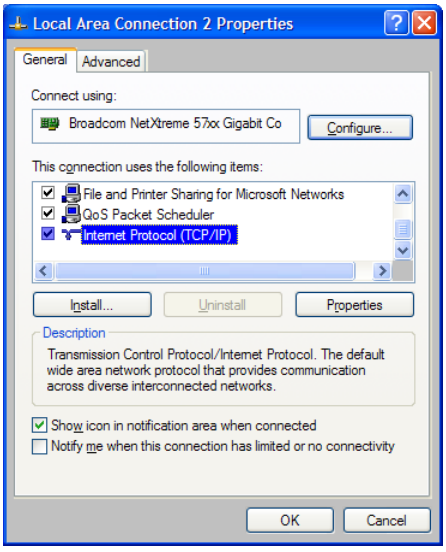
Where **"X"** is a decimal number between 1 and 254, the number **"0"** and **"255"** are reserved numbers to set-up the static **"IP"** adresses.

To set-up your computer Ethernet adapter "IP" address.

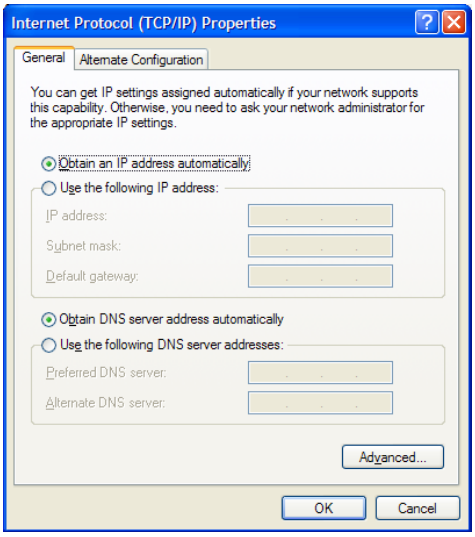
- On your computer desktop, click **Start**> **Control Panel**> next double left click on **Network Connection.** The following window below will pop-up.



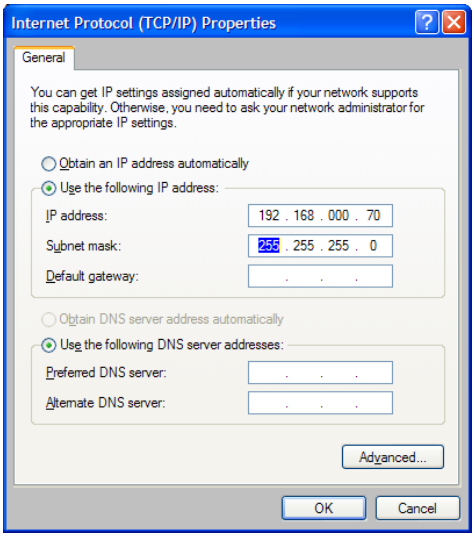
- Right click the Ethernet interface "local Area Connection X"
- Next, left click on "Properties". The following window below will pop-up.



- Next, scroll down to the “Internet Protocol (TCP9/IP) as indicated in the above window and left click on “Properties” The following window below will pop-up.

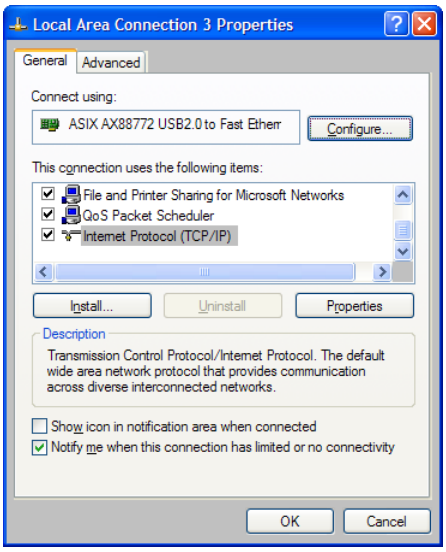

Internet Protocol (TCP/IP) Properties
General
Alternate Configuration
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
Subnet mask:
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

- Next, you will have to disable the **“Obtain an IP address automatically”** and select **“Use the following IP address”** The following window below will pop-up.

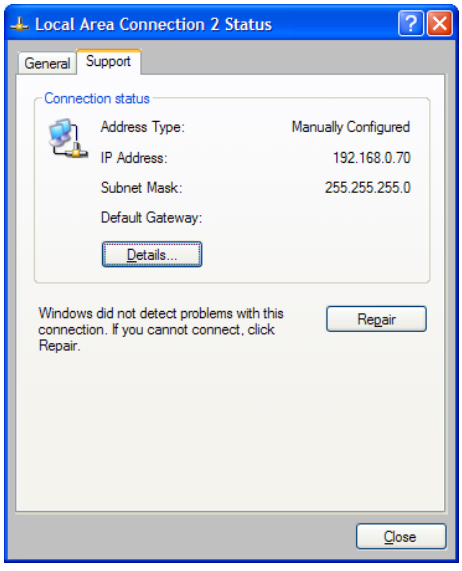

Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 000 . 70
Subnet mask: 255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

- Next, enter the above IP address “192.168.000.70” and the Subnet mask ”255.255.255.0”. Note! The above “IP” address is programmed by KML in the Ethernet Server Devise converter and can’t be change in the field. Next, click OK to save the new IP address, then the following window below will pop-up.
- Next, Click on OK to exit the above dialog window. After you have

exited the above window, you should re-check to make sure the new IP address is saved.



- In order to check your new IP address is saved go to your task bar located it the lower right side of your screen, next double Click on the dual monitor Icon, then the Local Area Connection Status window will pop up.



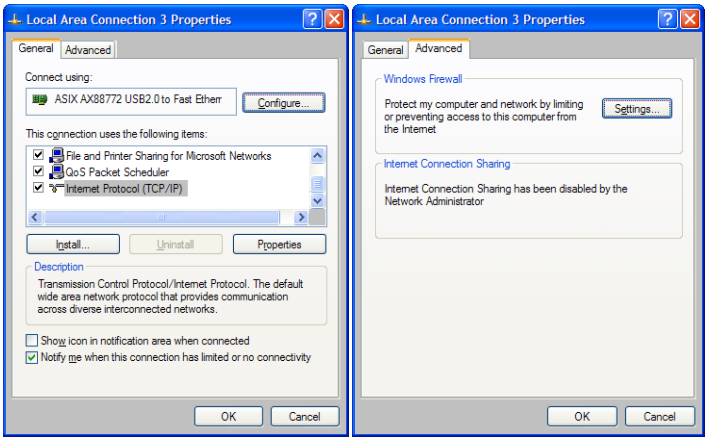
- Next Click on “Support” to display the IP address as indicated in the above window. If all OK just close the above window.

4.3.3 Security Firewall Protection System Set-Up

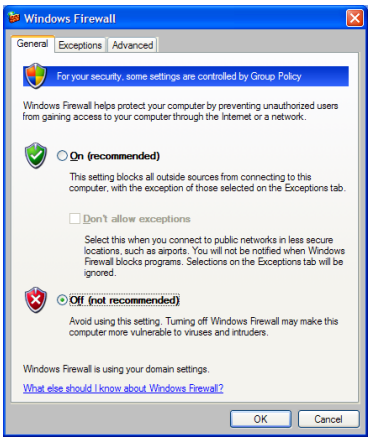
The Firewall protection is an important part of the processor unit. There is no problem in having the security protection disabled providing the processor in not connected to any outside provider "Ethernet" or connected to a central internal "Hub" system.

We recommend that the "Firewall" protection be **ENABLE** at all times. The following chapter will explain the proper procedure to Disable/Enable the firewall protection.

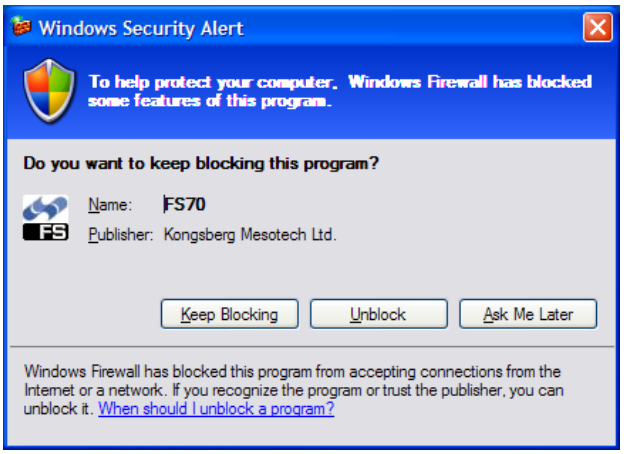
Go back to your local Area connection properties as indicated in the below window, next Click on the "advanced" tab then the following window to the left of the screen will be displayed.


Local Area Connection 3 Properties
General
Advanced
Connect using:
ASIX AX88772 USB2.0 to Fast Ethern
Configure...
This connection uses the following items:
File and Printer Sharing for Microsoft Networks
QoS Packet Scheduler
Internet Protocol (TCP/IP)
Install...
Uninstall
Properties
Description
Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.
Show icon in notification area when connected
Notify me when this connection has limited or no connectivity
OK
Cancel
Local Area Connection 3 Properties
General
Advanced
Windows Firewall
Protect my computer and network by limiting or preventing access to this computer from the Internet
Settings...
Internet Connection Sharing
Internet Connection Sharing has been disabled by the Network Administrator
OK
Cancel

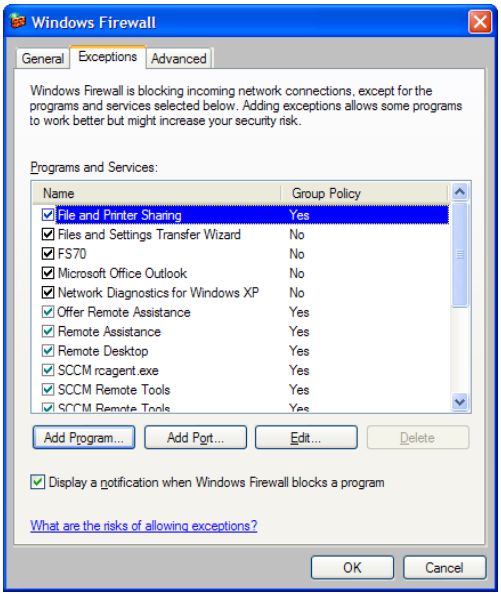
- Next, click on "Advanced > Settings" you have to disable the Firewall as indicated in the following window below. Then you may turn On or Off the Firewall protection, next Click OK to save your setting.


Windows Firewall
General
Exceptions
Advanced
For your security, some settings are controlled by Group Policy
Windows Firewall helps protect your computer by preventing unauthorized users from gaining access to your computer through the Internet or a network.
On (recommended)
This setting blocks all outside sources from connecting to this computer, with the exception of those selected on the Exceptions tab.
Don't allow exceptions
Select this when you connect to public networks in less secure locations, such as airports. You will not be notified when Windows Firewall blocks programs. Selections on the Exceptions tab will be ignored.
Off (not recommended)
Avoid using this setting. Turning off Windows Firewall may make this computer more vulnerable to viruses and intruders.
Windows Firewall is using your domain settings.
What else should I know about Windows Firewall?
OK
Cancel

The best approach is by having the Firewall protection turn "**On"** at all time. Then after you have installed the FS 70 Host Software on your processing unit what will happen next will be when you start the FS 70 application the Security Alert Windows will be displayed as indicated below.


Windows Security Alert
To help protect your computer, Windows Firewall has blocked some features of this program.
Do you want to keep blocking this program?
Name: FS70
Publisher: Kongsberg Mesotech Ltd.
Keep Blocking
Unblock
Ask Me Later
Windows Firewall has blocked this program from accepting connections from the Internet or a network. If you recognize the program or trust the publisher, you can unblock it. When should I unblock a program?

By Clicking on "**Unblock**" the security alert will automatically set-up an "Exceptions" as indicated in the window below.


Windows Firewall
General
Exceptions
Advanced
Windows Firewall is blocking incoming network connections, except for the programs and services selected below. Adding exceptions allows some programs to work better but might increase your security risk.
Programs and Services:
Name
Group Policy
File and Printer Sharing Yes
Files and Settings Transfer Wizard No
FS70 No
Microsoft Office Outlook No
Network Diagnostics for Windows XP No
Offer Remote Assistance Yes
Remote Assistance Yes
Remote Desktop Yes
SCCM rcagent.exe Yes
SCCM Remote Tools Yes
Add Program...
Add Port...
Edit...
Delete
Display a notification when Windows Firewall blocks a program
What are the risks of allowing exceptions?
OK
Cancel

Note: *No changes are required in the "Advanced" page*

4.3.4 Start Up

1. Check that the system has been properly installed and that all connections have been made to the PWR/TTM and the Processing Unit.
2. First turn on the PWR/TTM interface module. The voltmeter should display approximately 120 volts if on "120VDC" setting, 200 volts if

on the "200VDC" setting and approximately 60 volts if on "TEST" setting. The current meter should read approximately 0.15 – 0.7 amps.

3. Next turn on the display monitor, and then turn on the processing unit. The system will start up automatically.

4.3.5 Power-Up Configuration

For the system to operate properly the trawl unit configuration must be selected correctly. In addition, modification of these power-up configuration parameters is done in a special mode selected after power-up of the Processor unit.

The following sections describe the process of configuring these parameters. These steps must be followed only when the system is powered-up for the first time or when you have to replace the Processing unit or the TTM Module assembly.

4.3.6 Selecting the Trawl Output Voltage

You must select the proper trawl voltage in accordance with the under water trawl unit system you are using,

In the "OFF" position, no voltage is applied to the trawl cable.

In the "TEST" position, 60 VDC will be provided to the trawl cable. Note: The "TEST" position is provided for the old FS 3300, 1000 meter sonar head. You must connect the test cable supplied with the system to the front panel connector of the TTM marked "TEST CABLE" and position the Trawl/Test switch located on the front panel of the TTM module to "TEST".

In the "120 V" position, 120 VDC will be provided to the trawl cable. The 120 VDC is provided to run all FS3300, 1800 meter sonar head. The same procedure should be used to test an FS3300 1800 meter head.

In the "200V" position, 200VDC will be provided to the trawl cable. The 200VDC is provided to run all TS10, TS15, TS15S and the FS70 sonar heads.

NOTE: To test a TS10, TS15, TS15S and FS70 sonar head position the trawl voltage switch to 120 VDC, connect the test cable supplied with the system to the front panel connector marked "TEST CABLE" and position the Trawl/Test switch located on the front panel of the TTM Interface Unit to "TEST".

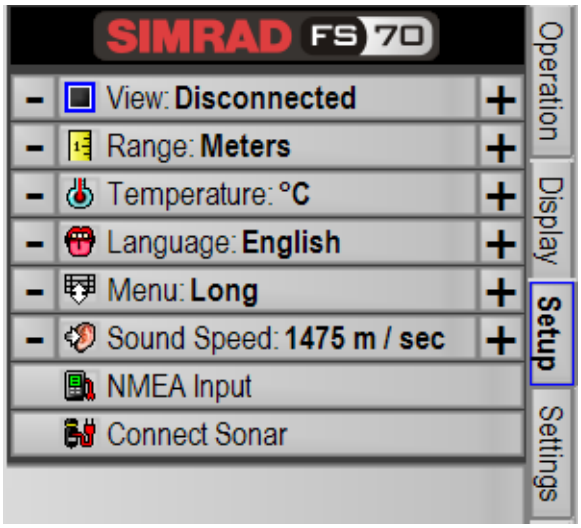
WARNING: Make sure you have selected the trawl voltage for the appropriate sonar head before turning power ON.

4.3.7 FS 70 Start-up Procedure

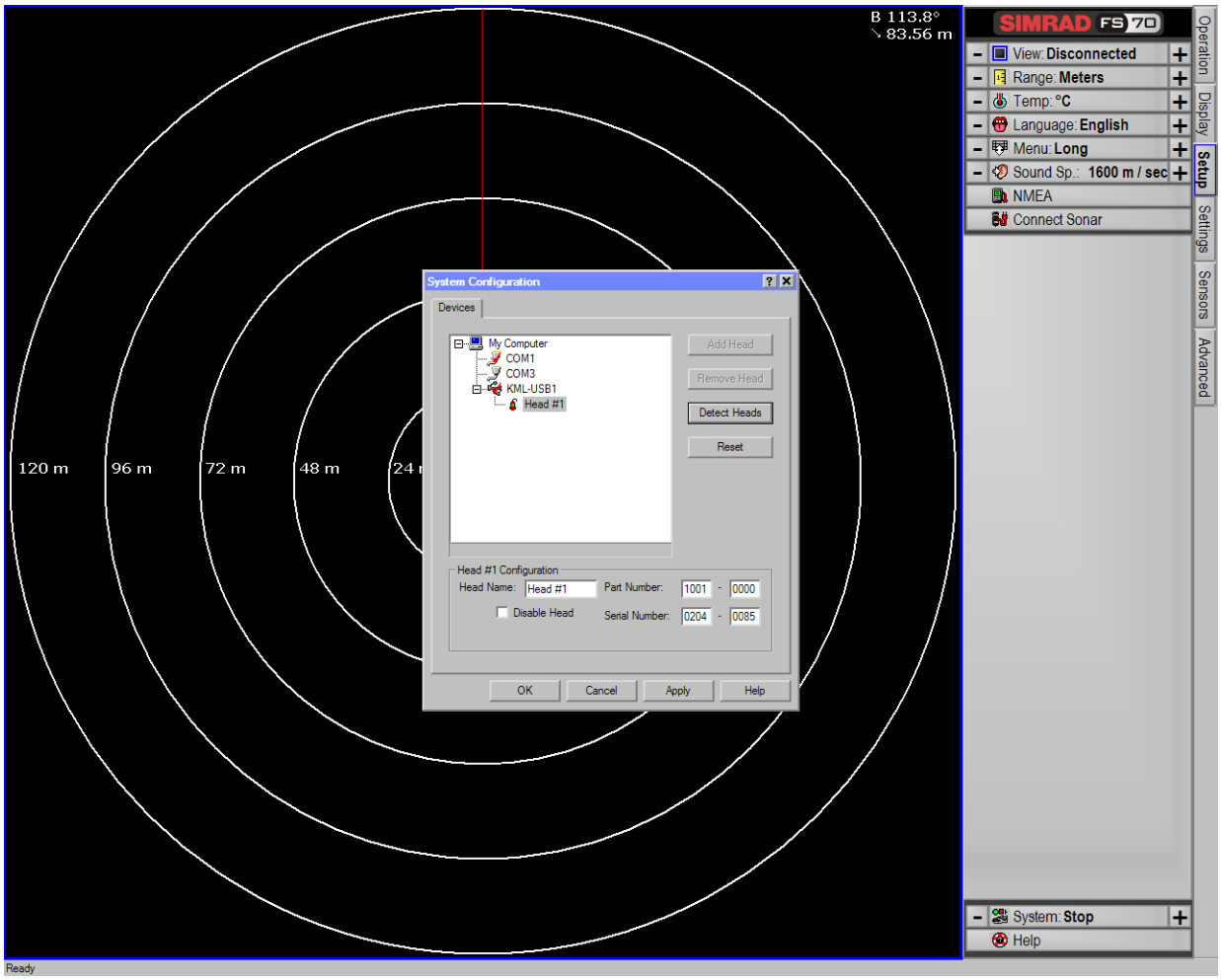
For the purpose of demonstrating the Start-up Procedure in this chapter, we are using the recommended Processing Unit that has 2 COM Ports, COM 1 and COM 3. The COM 1 and COM 3 Ports from the Processing Unit **are not** connected to the FS TTM module RS 232 port "A". No communication will be made from the COM 1 or COM 3 to the TTM module. We will be using an RS232/USB telemetry converter "KML-USB1" connected to the "A" port of the TTM module

We will be using an FS 70, 120 kHz/40 kHz Catch Trawl Sonar Head with the 200 kHz net sounder option with the integrated sensor module.

Configuring the System for the first time, or if you have replaced the Processing Unit or the TTM Module, you will select and "Click" on "Setup Page" and then the following window will pop up.



Next: Select "Connect Sonar" menu and "Click". The following "System Configuration" window will pop up, next "Click" on "Detect Heads".

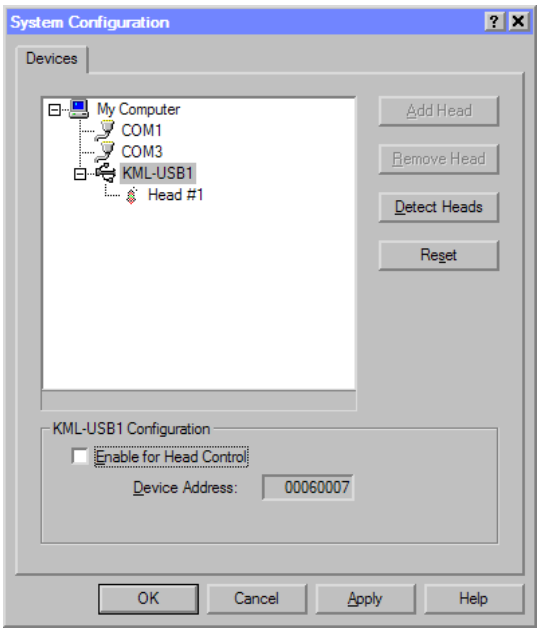


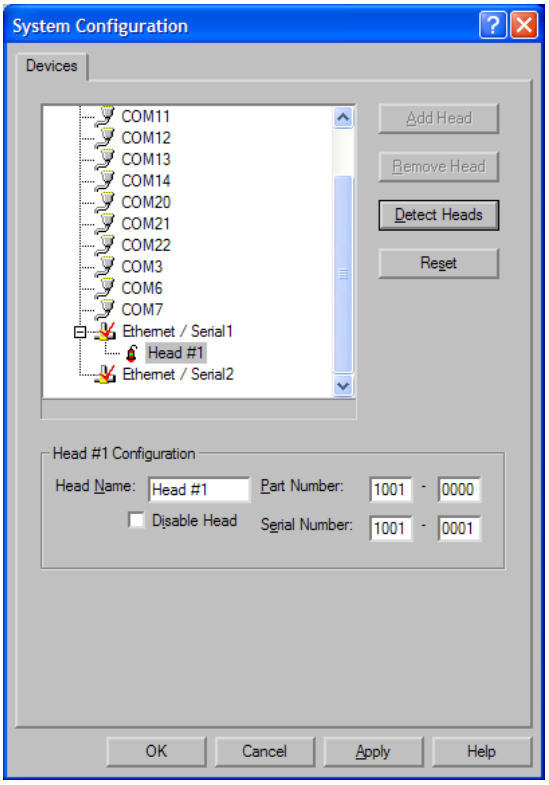
After the "Detect Heads" the above Window will pop up, note that no Com ports have been enabled yet (and re-check mark beside Com port). If you "Click" on "Detect Heads" from this position, the following warning window will pop up.

Detect Heads
No ports have been enabled for head control. Any port to which heads are connected must be enabled for head control.
Select an appropriate port and check "Enable for Head Control". Press "Apply" to impliment these changes.
OK

This warning window indicates that "No Ports have been enabled"; just "Click" "OK".

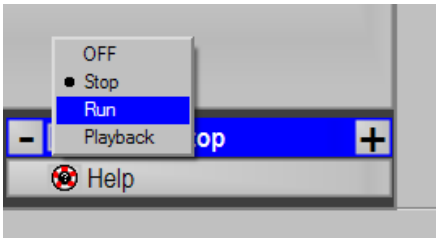
Next, the “System Configuration” window will reappear. Use the mouse to highlight KML-USB 1 or the Ethernet/Serial 1 if you are using the Ethernet Server Device. Use the mouse to “Enable for Head Control” (Left button click, check mark in box to enable).





"Click" on "Apply". The following window will appear, overlaying the above window, asking you to reboot the computer. Just "Click" "OK" and do not "Reboot the computer now"; "Click" "OK" in the "System Configuration" window.

To start the system, from the Operating Panel, position the mouse to highlight "System Stop" located at the bottom of the panel, next, left Click on "Stop" and a "Off, Stop, Run and playback window will pop up. To start the System, position the mouse on the "Run" bottom and Click.

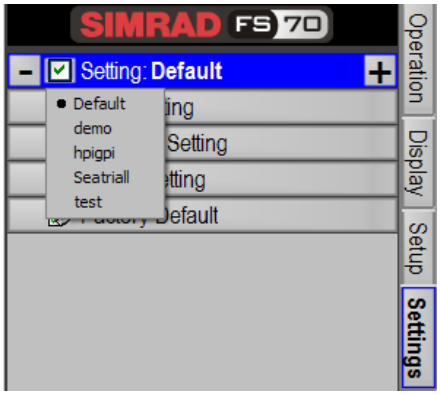


4.3.8 FS 70 Run-up Procedure

After you click on the "Run" Icon, the system will automatically detect and setup the sonar heads attached to the trawl cable. This operation will take approx. 40 sec.

After the system Run Up is completed the best way to setup your windows is to click on the separation window line and drag "Tile Windows". By clicking on the individual window, you can rearrange, change the size, according to your preference.

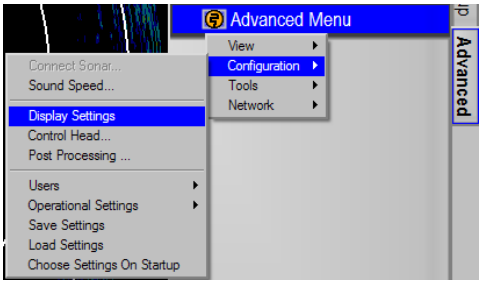
The first step after a successful power up is to configure the system for the desired "User Setting" operating mode and set-up, if not already done; you will automatically select "Default". Clicking on "Default" or clicking on specific types of fishery does this. Refer to the following window. From this point on we will be using the Factory Default setting.



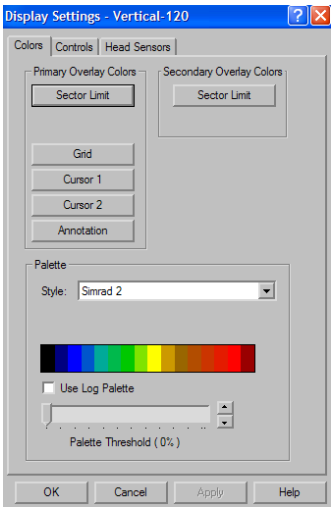
By clicking on the “Vertical Window” of the Sounder Window you will have control over the selected Sonar. The sonar you have selected will be highlighted by a blue bar across the top.

4.3.9 Advanced Menu Display Settings

Position the cursor on the “Display Settings” Icon, and Click. The window below will pop up.



By selecting the appropriate “Key”, you will be able to setup your Colours, Controls Setting and the Head Sensors.

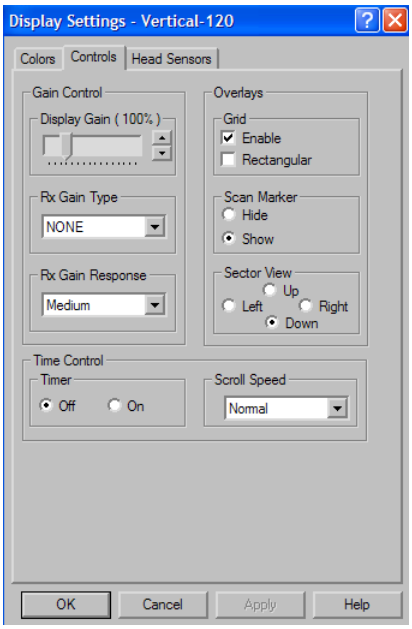


By clicking on the appropriate “key” you will be able to change the colour i.e. Overlay colours, Palette styles and threshold, etc.

The same operation will apply to the FS Sounder window.

4.3.10 Control Setting

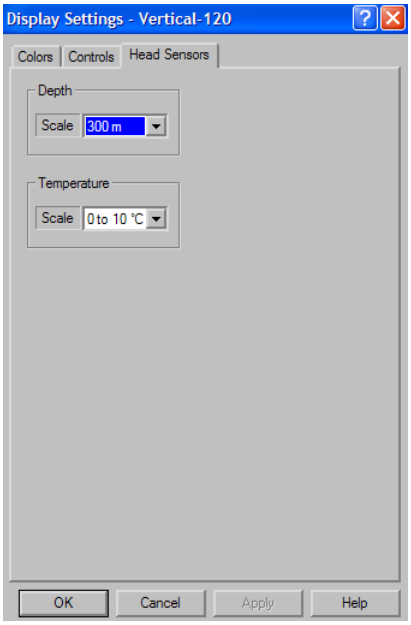
By selecting and clicking on the “Control” key on the above window, the following window will pop up.

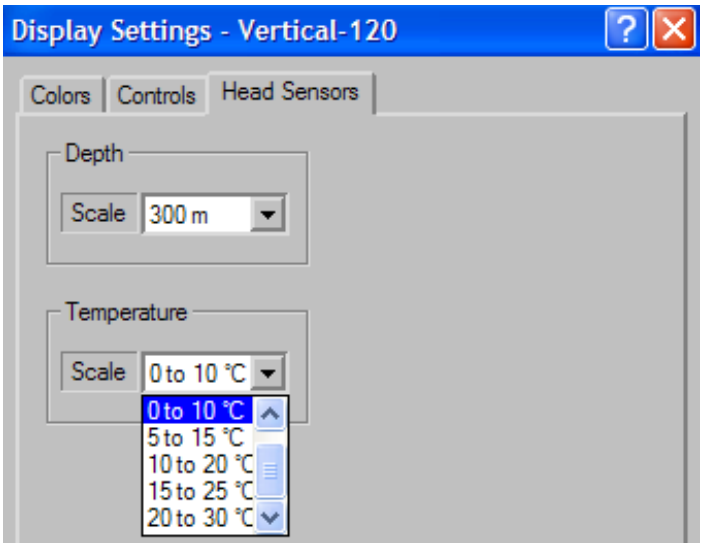


By clicking on the appropriate key, you will be able to setup your control setting, i.e. Gain Control, RX Gain, Scan Marker, etc.

4.3.11 Head Sensors Setting

By selecting and clicking on the "Head Sensors" key on the following window will pop up.

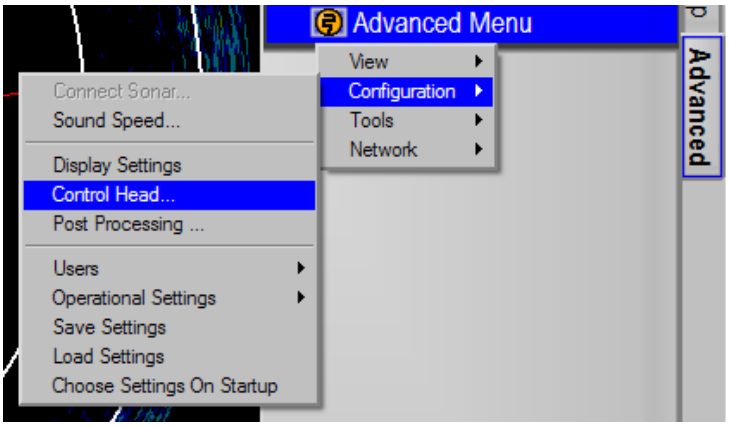




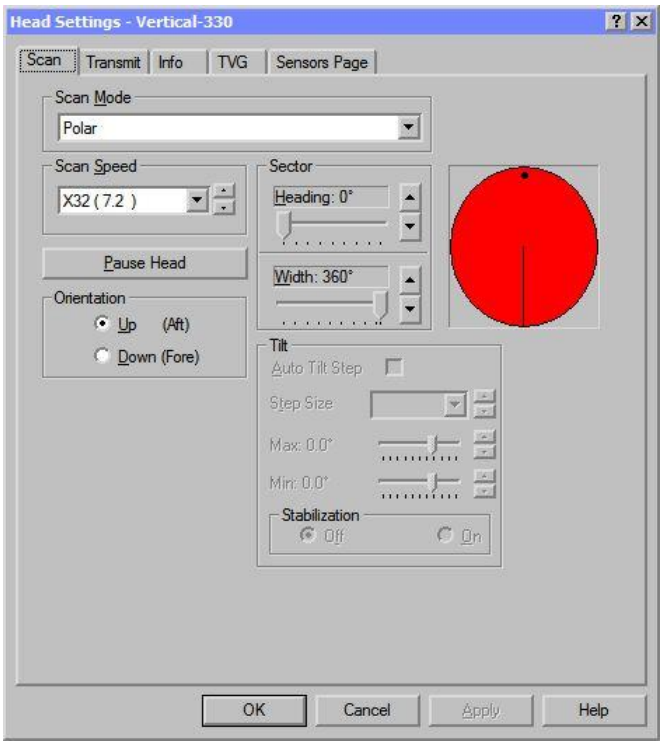
By clicking on the appropriate key, The Depth and Temperature range can also be changed.

4.3.12 FS 70 Head Setting

Position the cursor on the "Control Head" Icon, and CLICK. The window below will pop up.

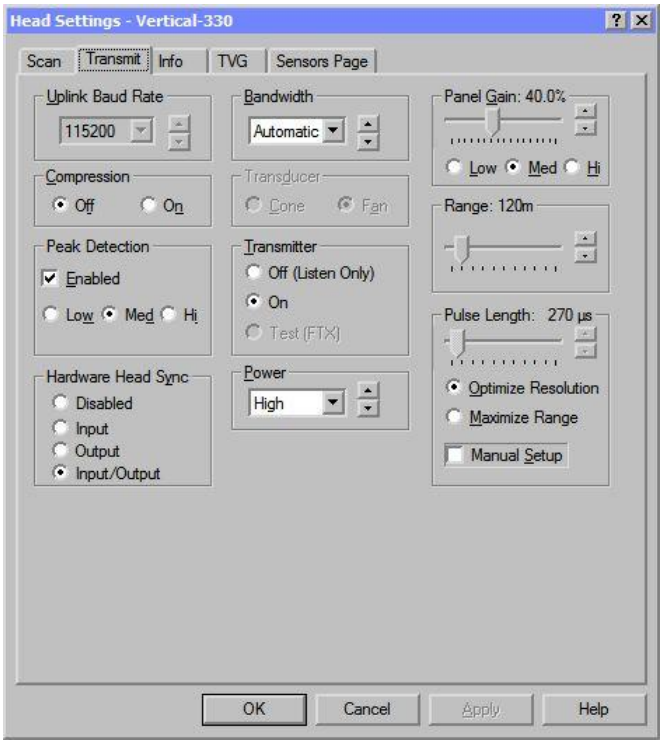


By clicking on the appropriate "KEY", you will be able to setup your Scan option. You also have full control of the Scan mode via the operator control panel.



4.3.13 Transmit Setting

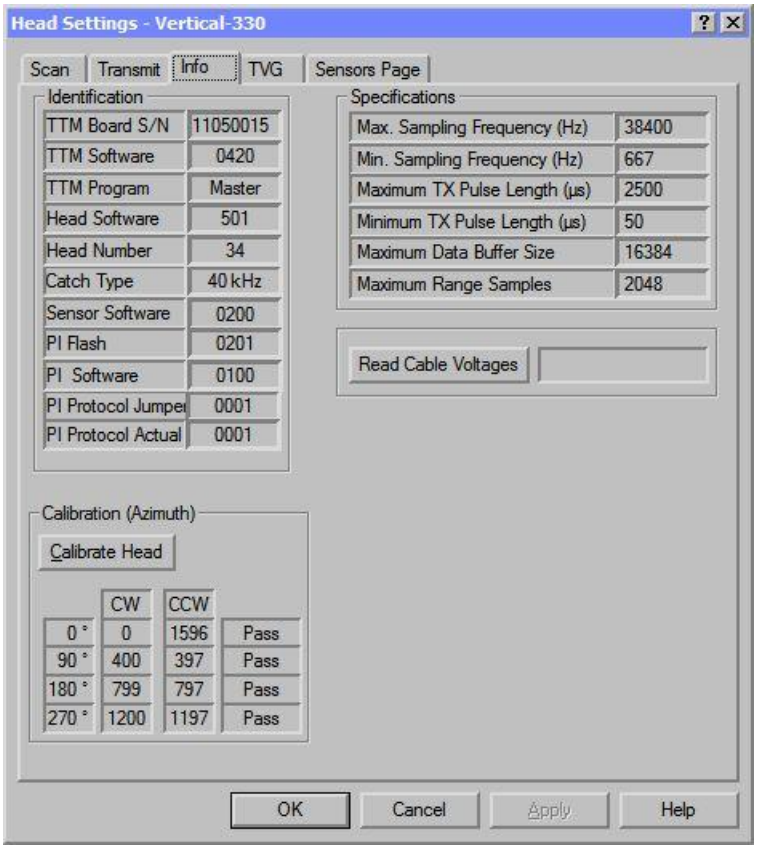
By selecting and clicking on the "Transmit" key on the above window, the following window will pop up.



By clicking on the appropriate key, you will be able to setup your Transmitter configuration in order to optimize fish detection. The same operation will apply to the FS Sounder Window.

4.3.14 System Info

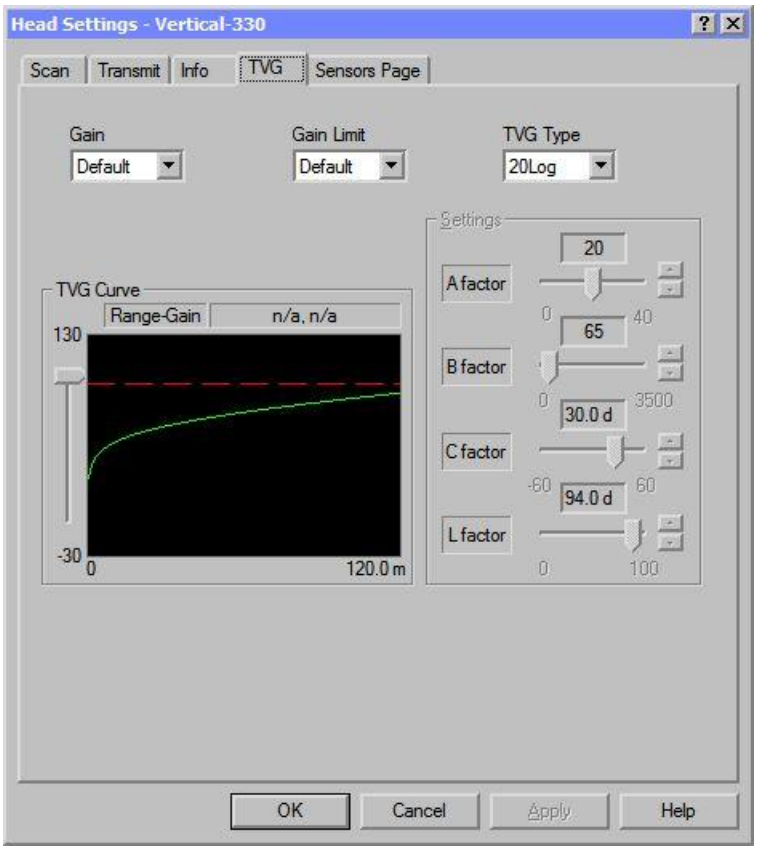
By selecting and clicking on the "INFO" key on the above window, the following window will pop up.



This INFO page will provide you with all the relevant information on the sonar head attached to the system.

4.3.15 TVG Page Setting

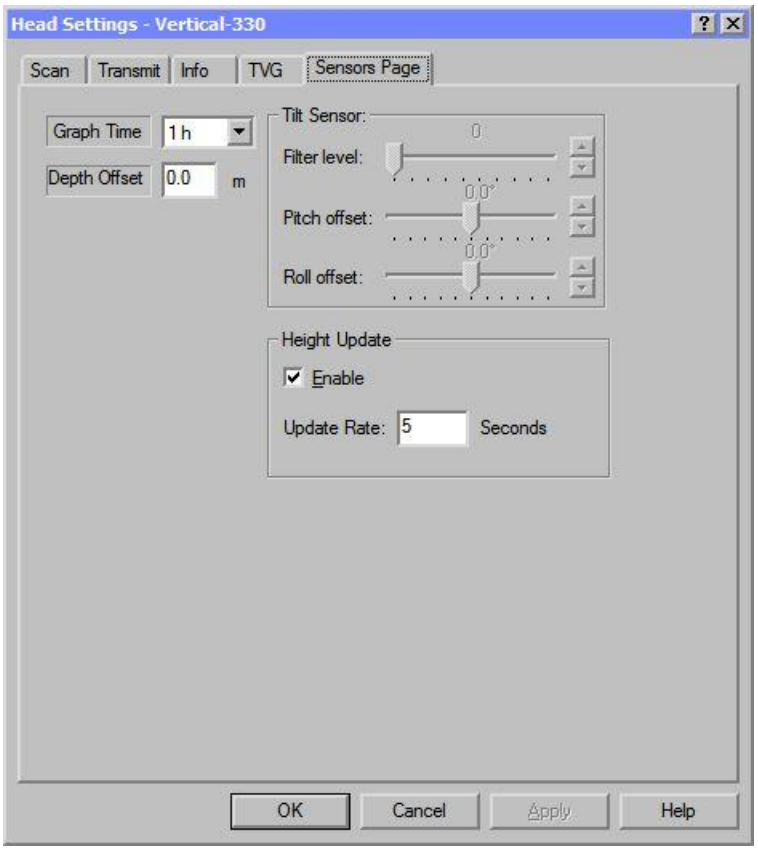
By selecting and clicking on the "TVG Page" key on the above window, the following window will pop up.



By clicking on the appropriate key you will be able to set up your TVG setting. You also have the option of customizing your TVG setting for a specific fishery. The same operation will apply to the FS Sounder Window.

4.3.16 Sensors Page

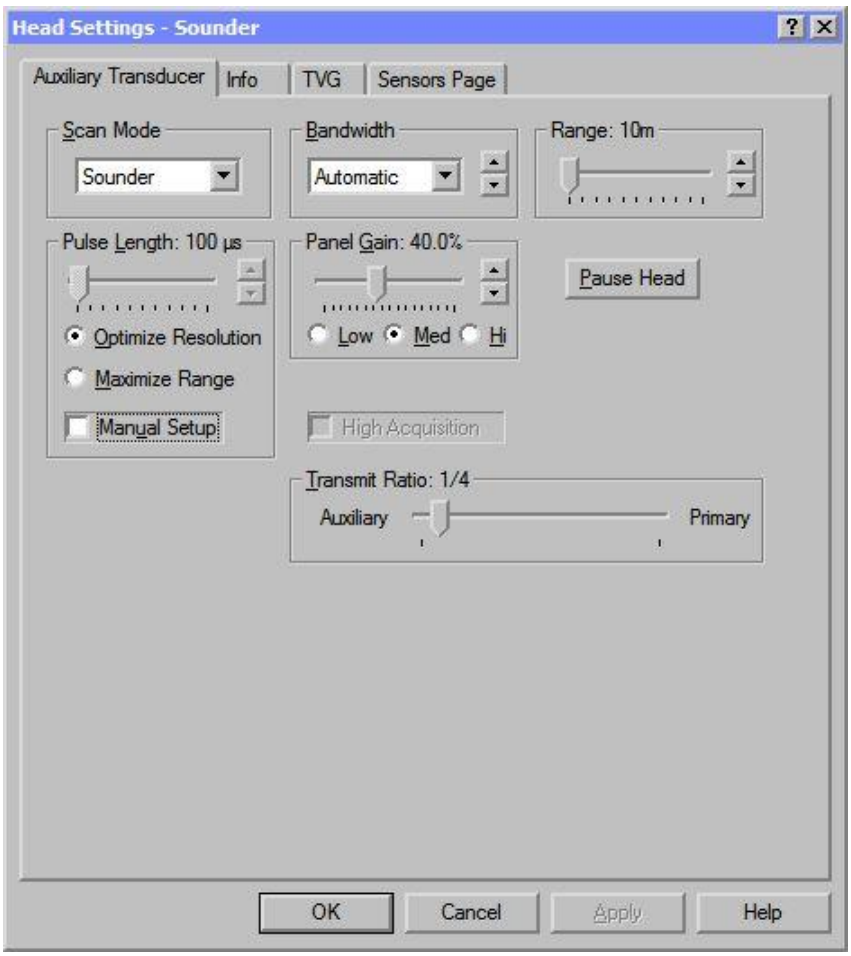
By selecting and clicking on the "Sensors Page" key on the above window, the following window will pop up.



This Sensors Page will provide you with all the relevant information on the sonar head attached to the system. Note that the Tilt Sensor filters and Offset are not applicable for the FS70 system.

4.3.17 Auxiliary Transducer (Net Sounder)

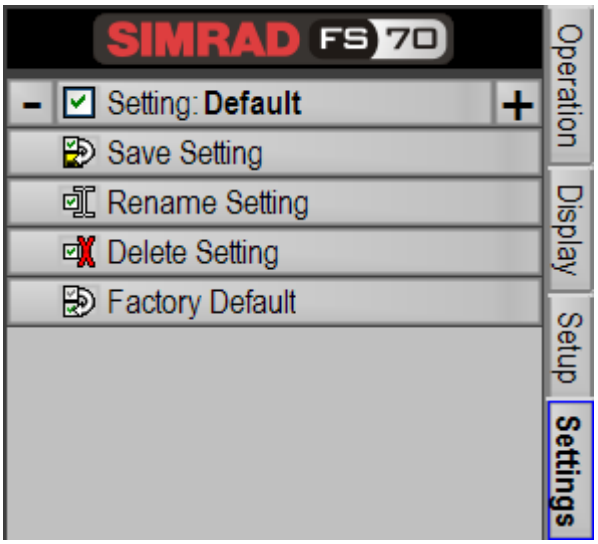
By Clicking on the "Auxiliary Transducer" key on the above window, the following window will pop up.



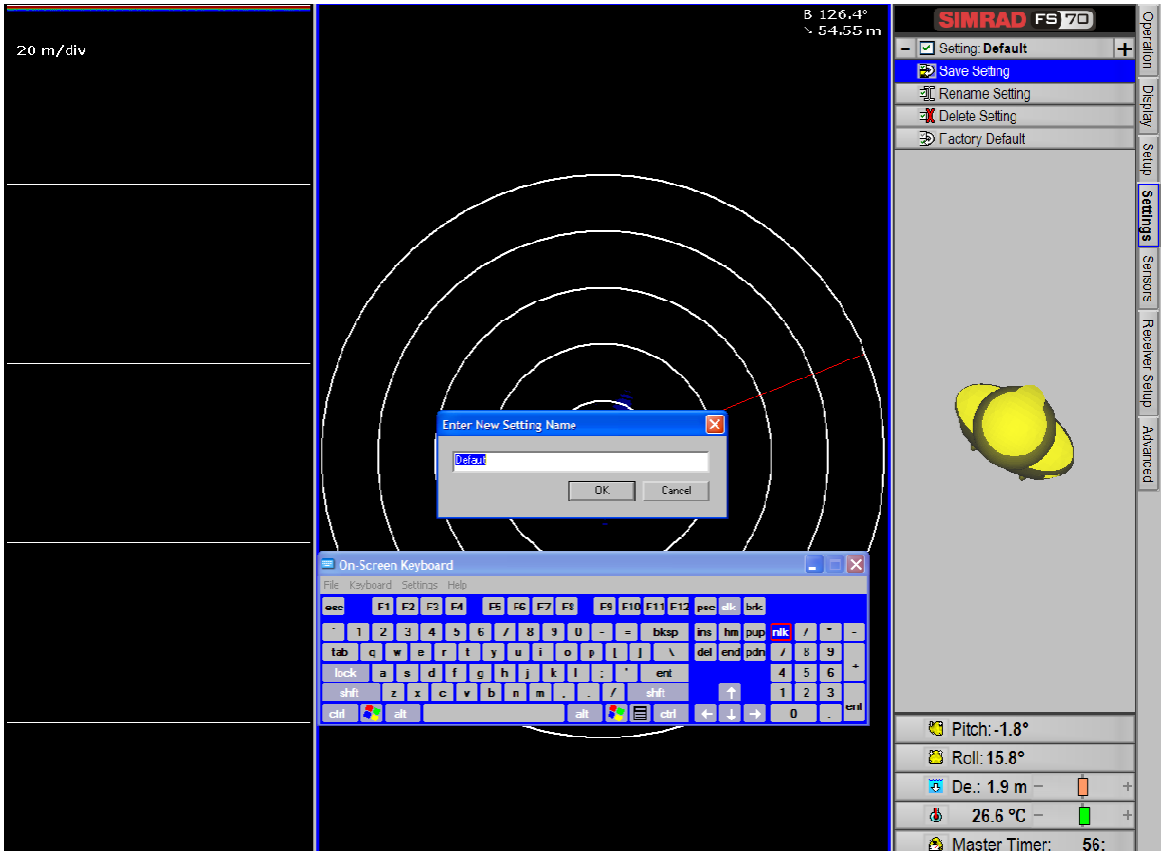
By clicking on the appropriate key, you will be able to control the FS Sounder option.

NOTE: The Auxiliary Transducer window is only applicable to the FS Sounder.

4.3.18 Save User setting



After you have completed your system configuration, you should "SAVE" your setting. Go to the User Menu and click on "Save Setting". The following window will pop up.

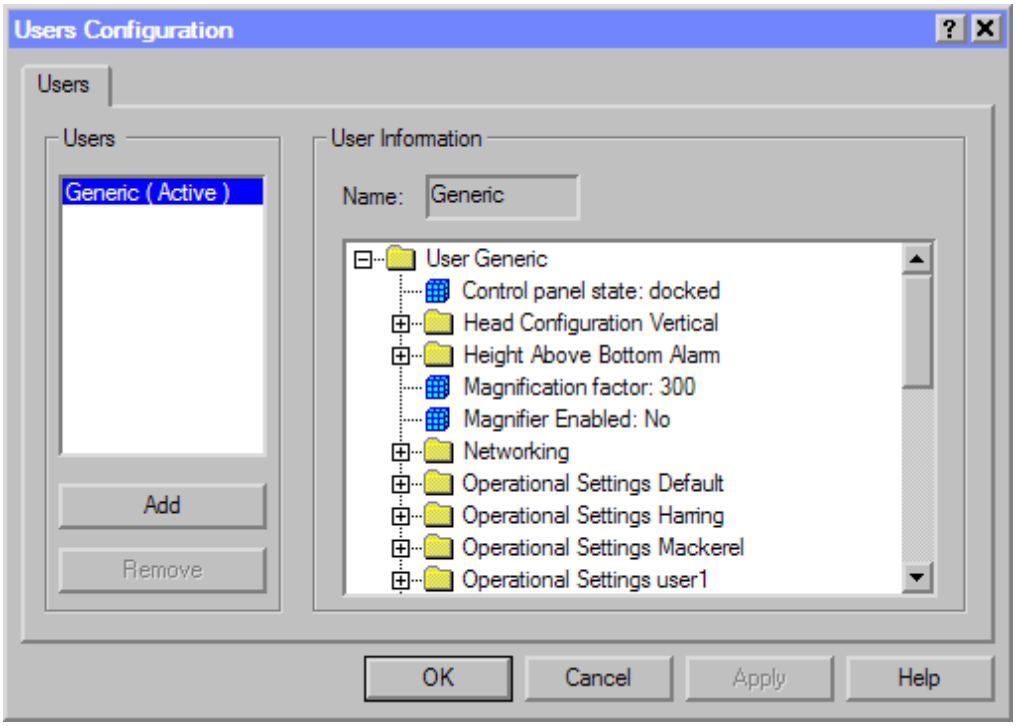


Type the name of the "New Setting Name" by using the pop up keyboard, next Click "OK"

4.3.19 Add User Setting

After you have completed your system configuration you should save your setting,

Go to the Header Menu and click on “Configuration”. Next click on “USERS”, then Click on “DEFINE”. The following window will pop up.



If you want to Add a User, the next step is to click “Add” then type your name in the User 1 window. Next click on “Apply” then “OK”.

The next time you start up the system, the “Select User” window will pop up automatically. You must then select the type of Fishery or User setting you want and “CLICK”. The system will start up with your personal setting.

When you Exit the system, the system will request if you want to save your setting. Just click “YES” or “NO”

NOTE: After the Service Engineer has completed the initial Setup and Sea trial, we recommend that all the settings are saved in the “GENERIC” setting or in a specific file created as a reference in case a problem occurs.

Do not change the “GENERIC” setting. If you have a problem, just go back and select the “GENERIC” setting, or to your specific file.

4.3.20 Final System Test

After preparing the trawl cable and before the final trawl unit assembly a system test should be conducted to insure correct operation of the FS 70 Trawl Monitoring System over the trawl cable.

As before, the start- up procedures should be followed to power up the system. Once the FS 70 has been turned on, the power supply voltage and current meters should be examined. Expected values are 0.2 – 0.5 A, (output voltage selection switch should be set to 200VDC). If the voltage and current values differ significantly from these values, it indicates a problem with the trawl cable or its connections.

If there are any errors during the calibration a status report page will appear containing the results that the control unit obtained from the tests performed. Again, any errors will be due to the trawl cable or its connections. Check the connections again and ensure that the signal polarity at the trawl unit is correct. A DC voltmeter can be used to check that the positive voltage is on the small pin of the pigtail when the FS PWR/TTM unit is powered up.

If all is okay then the sonar head will begin scanning and the sonar image display will appear.

4.3.21 Completing the Trawl Unit Assembly

First, the plastic cable strain relief supplied with the trawl unit must be bolted to the trawl cable. The location should be at or very near the pigtail splice, but NOT on the pigtail itself. You must slide the rubber hose on the trawl cable, if used, down so that approximately 3.4 cm (1’.2") of the hose is clamped inside the strain relief.

Next, the trawl cable is connected to the sonar head. Liberal amounts of Dow Corning #55 grease are applied to the connector surfaces before mating so that a water tight seal is obtained. The locking sleeve is then hand-tightened.

NOTE: Dow Corning “#55” grease must be applied to all mating surfaces of underwater connectors to insure proper sealing. Sufficient grease should be applied so that excess squeezes out with any air when the connectors are mated. RTV or any other sealant must NOT be used, and when tightening the locking sleeves do NOT use a wrench or pliers!

The plastic strain relief attached to the trawl cable is now placed in the trawl unit housing containing the electronics and the excess cable is routed in the housing. Care must be taken to insure that all cables within the trawl unit housing are properly placed to avoid being pinched and possibly damaged. The top half of the trawl unit housing is then placed on top and the two halves are secured together with the bolts supplied. Finally, the dome is secured over the Vertical Sonar Head transducer with four additional bolts.

The fully assembled trawl unit is now ready for mounting to the trawl head rope in the chosen manner.

4.3.22 Mounting the Catch Sensors

Proper mounting of the catch sensors on the cod-end is shown in drawing # 830-056482.

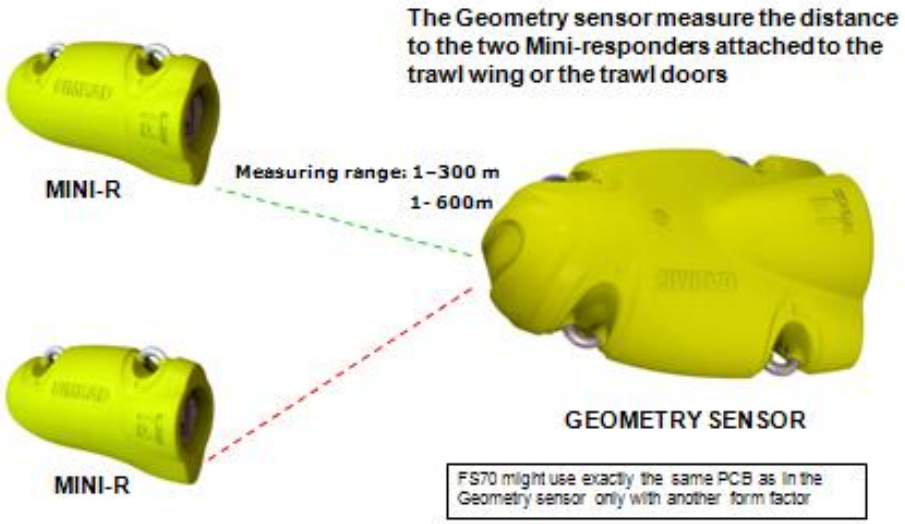
The fill of the cod-end and the sensitivity of the sensors are dependent upon the number of mesh knots between the catch sensor and the rubber straps. Make sure that the sensor is mounted in the correct direction with the transducer pointing towards the trawl unit (the metal lid pointing aft).

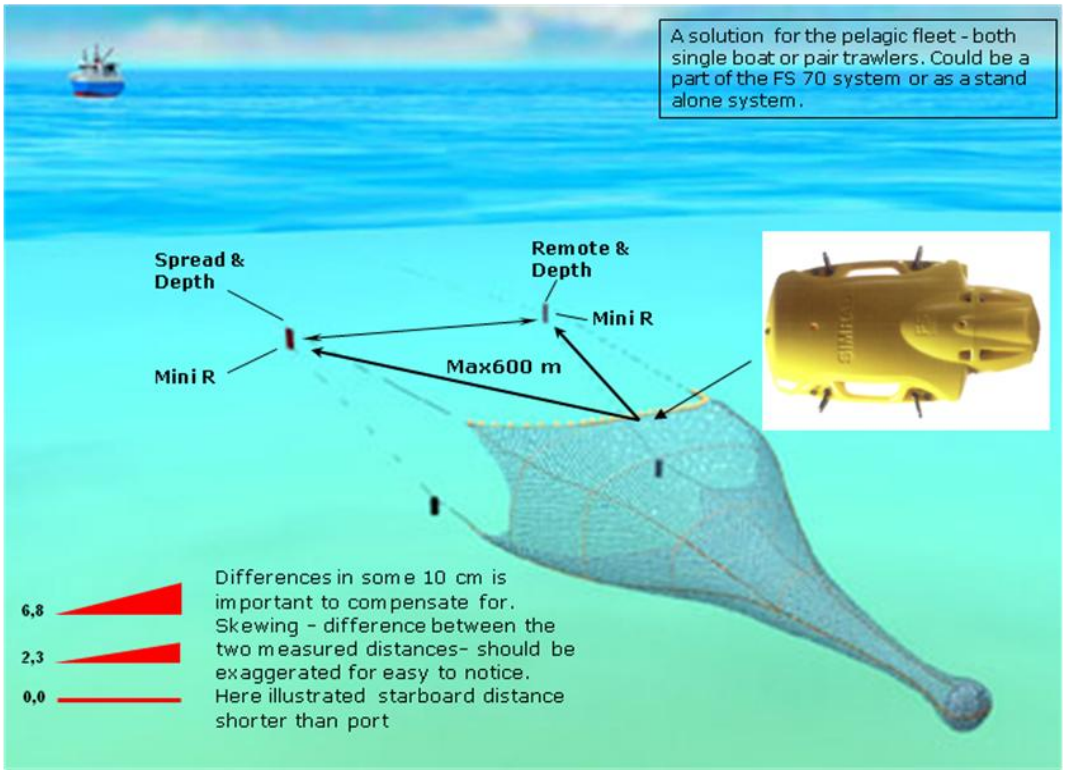
WARNING: Make sure that the chains do not strain the net when the cod-end is being filled with fish. This is controlled by stretching the net to capacity in the direction which is relevant AFTER THE SENSORS HAVE BEEN MOUNTED TO THE TRAWL. The purpose of the chains is to prevent the sensor from turning, and as an insurance against loss should the rubber straps break. Mounting the chains too tight can result in the fastening ears being ripped off.

If a system with four catch sensors has been ordered, sensors numbered 1 and 2 can be used on the trawl and the other two sensors kept for reserve.

For deep trawling, and when fish are abundant, it can be advantageous to mount three or four catch indicators in such a way that cod-end filling can be monitored continuously to insure that the trawl is hauled back in time.

4.3.23 Mounting the Geometry Sensors


The Geometry sensor measure the distance to the two Mini-responders attached to the trawl wing or the trawl doors
MINI-R
Measuring range: 1-300 m
1-600m
GEOMETRY SENSOR
MINI-R
FS70 might use exactly the same PCB as in the Geometry sensor only with another form factor


A solution for the pelagic fleet - both single boat or pair trawlers. Could be a part of the FS 70 system or as a stand alone system.
Spread & Depth
Remote & Depth
Mini R
Mini R
Max600 m
6,8
2,3
0,0
Differences in some 10 cm is important to compensate for. Skewing - difference between the two measured distances- should be exaggerated for easy to notice. Here illustrated starboard distance shorter than port

The PI Geometry sensors are mounted behind the headrope at the top of the trawl opening, or behind the footrope at the bottom depending on the required application.

The two Mini-R responders are normally mounted in dedicated adaptors on the two doors. They may also be mounted on the trawl wings.

Communication link between the PI sensors and the two Mini-R responders may be done via the FS 70 head rope unit forward hydrophone located inside the DP housing or via the PI hydrophone mounted below the ship hull.

Refer to the SIMRAD supplied PI Net Geometry Installation Manual for additional information.

4.3.24 PI Receiver Basic Configuration Settings

When you put the PI Geometry to use, you must set it up with one unique sensor number with two measurements. Only one update rate can be chosen, this is common for both measurements. The channel numbers are defined individually for the two measurements.

Both the update rate and the channel numbers must be chosen according to the sensor's configuration. Write down this configuration for future reference.

For default settings, to the SIMRAD supplied PI Net Geometry Installation Manual table in section about sensor configuration.

If your PI system is fitted with MMI software version **0.50** and DSP software version **1.11** or later, use the following recommended receiver settings:

– Interference filter:	On
– Interference filter level:	8
– Sensor filter:	Light
– Catch/Bottom sensor filter:	Light
– AGC:	Off
– Manual gain:	20 dB
– Multipath filter:	On
– Water profile:	Salt
– Detection threshold (DT):	8 dB
– Maximum shooting speed:	1 knot

5 TROUBLESHOOTING AND MAINTENANCE

5.1 Introduction

This section provides instructions for the proper handling, maintenance and troubleshooting of the FS 70 Trawl Monitoring System.

5.2 System overview

The Simrad FS Trawl Monitoring System FS 70 consists of wheelhouse electronics and a trawl unit. The wheelhouse electronics include the display unit, the FS Processing Unit, and the PWR/TTM interface unit. The trawl unit electronics include the sonar head with a integrated sensor module, receiver transducer, and up to four catch sensors and door spreads sensors. In addition to the above equipment, but not supplied by Simrad, the system requires a winch with slip-rings, and a trawl cable for connection of the FS trawl unit to the wheelhouse electronics.

The FS PWR/TTM unit contains the power modules to provide the Test Voltage, the 120 and 200 VDC @ 1 A maximum for powering the trawl unit electronics, and the voltage and ampere meters. The low-frequency telemetry adapter “LF 1” Low Frequency PCB and the telemetry translation module “TTM” PC interface is now incorporated into one unit.

With the FS 70 system, the trawl cable connects directly to the PWR/TTM unit. Furthermore, the compensation for signal loss over the long trawl cable is done automatically within the Processor Unit each time it is powered up. In this way changes to the cable loss do not affect the intensity of the sonar return displayed.

5.3 Handling & maintenance

The most common causes of failures to the Simrad FS Trawl Monitoring system are:

1. Trawl cable and/or winch slip-ring problems,
2. Sonar head and sensor module connector and interconnect cable failures,
3. Excessive impacts and/or physical damage to trawl unit electronics.

In all three cases, proper handling and maintenance can significantly reduce the frequency of FS failures. The following sections outline the recommended handling and maintenance for the FS system.

5.3.1 Wheelhouse Electronics

Once installed these units require little maintenance other than removing dust. A damp, lint-free cloth should be used for this purpose.

5.3.2 Trawl Unit

The Trawl Unit is subjected to the harshest conditions and therefore proper handling and maintenance is crucial to ensure trouble free operation.

5.3.2.1 Handling Tips

- Though the trawl unit electronics are ruggedized for the fishing environment mishandling or repeated impacts may result in damage to, or failure of, the electronic components. Care should be taken at all times ***to avoid dropping or impacting*** the trawl unit or the individual components.
- ***Avoid scratching*** the surface of the sonar head housings. The anodized surfaces (black coating) are there to protect the electronic housings from corrosion and any damage to these surfaces will increase the likelihood of corrosion.
- Ensure correct installation of the sonar head into the trawl housing to avoid improper operation. A locking block is located at the end cap to secure the sonar head into the lower part of the housing.
- Protect connector mating surfaces from corrosion and damage. At the first sign of damage, connectors should be replaced!
- Pigtails must be properly attached to the trawl cable and the

connector mating surface must be protected from moisture and dirt at all times. Failure to do this may result in water damage to the cable causing improper operation of the sonar system.

5.3.2.2 Maintenance Schedule

For optimum performance and trouble free operation, follow the maintenance schedule below.

- Beginning of Fishing Season

  Service all connectors

- Every Two Weeks of Continuous Use

  The trawl unit package should be opened and the components cleaned with fresh water. The trawl sonar head should be inspected for corrosion or damage. Service all connectors. The FS processor should be checked and cleaned if required.

- End of Fishing Season

  The trawl unit package should be opened and the components cleaned with fresh water. The trawl sonar head should be inspected for corrosion or damage. Service all connectors and cover them with plastic. Store unit in a dry, clean area.

- Every Twelve (12) Months Heavy usage or Every Two Years

  Return the trawl sonar to a qualified Simrad service facility for inspection of connectors, seals and shaft assembly. Have parts replaced as required.

- Every Four Years

  *The trawl sonar head should be returned to a **qualified Simrad service facility** for recalibration and upgrade to the latest specifications, and inspection of connectors and housings for damage.*

5.3.2.3 Connector Maintenance

Proper connector maintenance is crucial to the prevention of connector failure that may result in failure of the sonar system and possible water damage to the sonar head. The following steps should be taken whenever the connectors are assembled, or at regular intervals as outlined in the "Maintenance Schedule" section above.

1. Wipe connectors clean of old grease and dirt with a lint free cloth.
2. Inspect the connector's metal contacts and sealing surfaces for corrosion, wear or damage. If problems are found, return the unit to a qualified Simrad service facility for replacement of the connector!
3. Apply liberal amounts of Dow Corning "55" grease to each of the connector prongs and to the sealing surfaces of the connectors. **Do not use a silicone rubber adhesive sealant!**
4. Press connectors together until fully seated. Excess grease should be squeezed out of the connector sockets.
5. Hands tighten the locking sleeve. **Do not use a wrench or pliers!**
6. When separating the connectors, avoid wrenching or bending connector.

WARNING: Failure to correctly maintain connectors may cause damage to the system and will void the warranty.

5.3.2.4 Excessive Impacts

Though the FS Trawl Unit is designed for the harsh fishing environment, excessive impacts to the trawl unit or the individual components may damage them.

Excessive impacts to the trawl unit usually result in physical damage to this housing. However with the newer, more durable urethane housing, excessive impacts to the trawl unit may NOT cause physical damage to either the trawl housing or the exterior of the individual electronic units, but may result in ***damage to the electronics***.

NOTE: As with all electronics, careful handling of the trawl unit will reduce the likelihood of FS failures.

5.3.2.5 Corrosion

If on examination corrosion has occurred to the sonar head metal parts these areas should be cleaned well and the area sealed with paint or a sealant to prevent continuation of the corrosion in this area.

WARNING: If corrosion is allowed to continue, flooding of the unit may result.

5.3.2.6 Shaft or Transducer Damage

The transducer and shaft are protected by a flexible dome and should be inspected for damage. If the transducer dome has experienced an impact this could bend the shaft and eventually allow water into the housing. If the shaft is bent the unit should be returned to a qualified Simrad service facility for replacement of the shaft seal assembly.

NOTE: If the sonar head is correctly installed in the trawl unit, with proper placement of the locating block, then damage to the transducer and shaft should not occur.

5.3.3 FA 701 Catch and PI Sensors

The catch sensors are relatively maintenance free except to charge the batteries. Refer to your Simrad FA701 and or PI 32 Catch sensors operator and installation manual for the information on both the charging of the catch sensors and the proper mounting of these sensors on the trawl.

5.3.4 Winch Slip-Rings and Trawl Cable

The winch slip-rings and trawl cable are the umbilical cord between the processor unit and trawl unit electronics, and are critical to the proper operation of the Simrad FS Trawl Monitoring system. Damaged, worn or poorly maintained cable or slip-rings will degrade the performance of the system and may cause or lead to a complete system failure.

Worn, dirty or wet winch slip-rings may add noise, current spikes or additional losses to cable. Slip-ring assemblies should be checked regularly for wear and proper sealing against the weather. Slip-ring technology has improved considerably over the past several years and sealed units from several suppliers (such as IEC Corp.) have proven to be very reliable.

Trawl cables, particularly the plastic jacketed type, are extremely susceptible to damage and wear that may adversely affect system operation. Proper maintenance is very important to ensure cable losses are minimized and adequate isolation between the cable conductors and sea water are maintained. Common problems include poor splices, water damage, cracked or worn outer casing (insulating jacket), or severed cable. The trawl cable should be routinely checked for damage and affected sections removed, splices redone or the entire cable replaced as required.

The pigtails spliced to the end of the trawl cable are susceptible to damage and corrosion and must be checked and if necessary replaced every time prior to connecting the trawl unit. When not in use the pigtail should be wrapped in a plastic bag and stored out of the weather and away from being stepped on or damaged in any other way.

Polarity of the signals applied to the trawl cable (coax) may also be important in the proper operation of the system. To provide optimum shielding from noise, we recommend the positive signal be applied to the center conductor and the negative signal to the shield.

5.4 On-board System Troubleshooting

There are a number of tools available with the FS Trawl Monitoring system that allows its performance to be checked. When these tools are utilized as part of the regular maintenance they provide information about the state of the system and allow it to be monitored. This can be valuable in detecting problems before they cause an FS system failure.

In the event the FS Trawl Monitoring system does not operate, correct care must be taken to properly diagnose the cause of the failure. Quite often the failure is thought to be with the FS electronics when the actual cause is due to the winch slip-rings, the interconnect cable or the trawl cable. The following sections provide helpful advice on troubleshooting the FS system.

5.4.1 System Tools

The system tools available for troubleshooting the FS system are:

- Test Cable
- Voltage and Current Meters
- Cable Gain Number
- Cable Voltage and Resistance
- System Info Page
- Diagnostic Recording “SMB Format”
- Errors Message Log File
- 4 Hrs of Auto Recording “SMB Format”
- User Recording “SMB Format”
- Sonar Images and System Text Document “Bitmap Image Format”

5.4.2 Test Cable

With every FS Trawl Monitoring system a 50' test cable is supplied for testing the system without requiring the 3rd wire trawl cable. This provides a quick and simple way of verifying whether problems are due to the trawl cable or winch slip-rings.

NOTE: The initial system performance values that are measured on the test cable during the installation and commissioning of the system provide a base for later comparison.

5.4.3 Power Supply Meter Readings

The 3rd wire trawl cable voltage and ampere meters are useful for monitoring the trawl unit power requirements. For the most benefit these meters are mounted on the front panel of the PWR/TTM unit next to the trawl voltage selection switch for continuous monitoring.

When the system is first installed or when the trawl cable is replaced the trawl cable voltage selection switch should be set to 200 VDC and current values should be recorded when the unit is running in normal operating mode (i.e., with range and scan speed set to values normally used during fishing) or set to the Factory Default Setting.

Typical "Current Meter" values will typically vary from 190 mA to 350 mA depending on the type of sonar head connected to the 3rd wire. To facilitate monitoring of this information these values should be recorded on the test report charts provided at the end of this manual.

Any changes in the recorded meter values during normal operation may indicate a potential problem even if the unit continues to operate properly. Common cases are:

1. **Current Meter Jitters:**

   This is commonly due to dirty, wet or worn winch slip-rings that cause current spikes on the trawl cable when the winch is rotating.

A test for slip-ring problems is to slow down the winch (at high winch speeds you will not see jitter on the current meters) and check if the current meter is jittering and whether the jitter rate changes with the winch speed.

Note: The current meter will pulse each time the transmitter pings. The pulse will be at a constant rate depending on your operating setting.

2. Increase in Current:

Gradual increases in the trawl unit current may be due to either the trawl cable or the trawl unit electronics. A higher cable closed loop resistance, due to cable damage, poor splices, poor winch slip-rings or water ingress in the cable may reduce the voltage supplied to the sonar head below the required minimum DC voltage. This will result in the sonar head drawing more current. Alternatively there may be a problem in the sonar head that causes additional current draw.

To diagnose this problem a current reading should be made with the system running on the test cable. If this value is higher than a previous value obtained on the test cable or when connected to the cable simulator then the problem is likely with the trawl unit electronics. If the current readings are the same on test the cable as previously obtained, then the trawl cable and winch slip-rings should be checked.

5.4.4 Trawl Cable Gain

By periodically checking the cable compensation gain obtained from the system unit and comparing it to a previously recorded value the condition of the 3rd wire trawl cable can be monitored. Acceptable cable gain values have less than "**10,** XXX" for the first gain number. If the first gain value is over "**10,** XXX" then there may be a problem with the 3rd wire trawl cable and the system should be checked on the test cable. To facilitate monitoring of the trawl cable, the cable gain values should be recorded on the test report.

5.4.5 Testing the Trawl Cable

If after testing the FS system the trawl cable is suspected to be faulty, then troubleshooting is needed to determine what and where the problem is. For problems that are not obvious, however, this can be quite difficult to do and may require someone experienced with testing trawl cables. This following paragraph provides some basic tips in troubleshooting trawl cables but is in no way a complete and comprehensive guide.

5.4.5.1 Trawl Cable Insulation Measurement

The use of a Mega-Ohmmeter to check the impedance of the trawl cable may be the most useful test. It can be done with or without the slip-rings connected and readings should be taken between the cable's two conductors and also from each conductor to the fishing vessels hull. Typically the impedance should be greater than 2 MΩ, and preferably over 6 MΩ and lower readings may be indicative of potential problems with the third wire cabling.

Caution: The FS system MUST be disconnected from trawl cable during Mega-Ohmmeter tests to prevent possible damage to the electronics!

If the impedance between the cable's two conductors is relatively low then the cable should be inspected for possible problems with splices, water ingress, and moisture in slip-rings (if connected during test).

If the impedance between the cable's conductors and the vessel's hull is relatively low then inspect the cable for any visible damage to the cable armour/jacket. Other possible causes are bad splices or bad slip-rings (if connected during test)

5.4.5.2 Closed Loop Resistance, Voltage and Current at Trawl Unit

As previously mentioned, the closed loop resistance must be less than 100 Ohms for proper operation of the FS system.

This test should be done with the FS system disconnected but with the winch slip-rings included. For whatever cable type and length used the following specifications must be met for operation with the Simrad FS trawl Monitoring system:

Cable Closed Loop Resistance <100 ohms

Signal Attenuation Through Cable:

- <40 dB (1/100 signal amplitude) @ 55 kHz
- <20 dB (1/10 signal amplitude) @ 12 kHz

The cable closed loop resistance determines the maximum voltage drop along the trawl cable. For proper operation the FS 70 trawl unit electronics require a supply voltage of 60 to 200 VDC. For typical operation, the current is approximately 195 mA to 250 mA with peaks to 450 mA. The equations for calculating the voltage drop along the trawl cable are described in the next paragraph.

There are two methods to check the closed loop resistance of the 3rd wire:

Method 1

To do the test the conductors at one end of cable should be shorted together. An ohmmeter is then used at the other end of cable to measure the resistance between the conductors.

Method 2

An estimate of cable losses and resistance can be done by measuring the voltage and current at the trawl unit. This measurement requires the trawl unit electronics to be connected and the FS system powered up. This test is done where the trawl cable pigtail plugs into the sonar head.

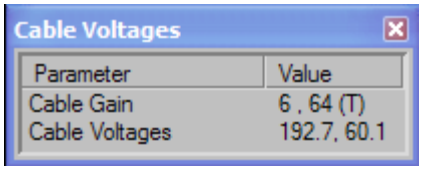
The cable closed loop resistance determines the maximum voltage drop along the trawl cable. For proper operation, the FS Trawl Sonar System requires between 120 VDC or 200 VDC @ 1 A maximum depending on the type of sonar head you are using. For typical operation, the current is approximately 195 mA to 350 mA with peaks to up to 450 mA.

The equation for calculating the resistance of the 3rd wire trawl cable from the TTM to the sonar head is:

$$\text{Cable Resistance} = \frac{\qquad\qquad\qquad\qquad\qquad\qquad}{}$$

Example:

- The TTM output DC voltage is set at 200 VDC.
- The Cable Voltage at the head is 192.7 VDC



- Total DC voltage drop along the 3rd wire cable is 7.3 VDC.

The TTM AMP meter located on the front panel indicate a current of 0.3 A. Therefore the calculated total resistance of the 3rd wire cable is:

$$R = \frac{}{}$$

The maximum allowable closed loop cable resistance is 100 ohms.

5.4.5.3 Test for Water Ingress in the Trawl Cable

When a trawl cable is damaged or there is a poor splice, sea water can get into the cable. As a result, the cable may act as a battery - producing a small dc voltage across the conductors of the cable. This is detrimental to the operation of the FS system and all affected cable should be removed.

To test for this the trawl cable should be disconnected from the FS system and a voltage meter connected to the trawl unit end of the cable. If water is present, then there may be a reading of 2 - 3 volts.

5.4.6 Telemetry Errors

In the normal operation of the FS Trawl Monitoring system commands are sent from the processor unit down the trawl cable to the trawl unit electronics and acknowledgments are then sent back up to the processor unit. Some error checking of these commands is performed to monitor the performance of the Uplink and Downlink telemetry.

Telemetry errors can result from noise induced on the trawl cable due to interference or problems with the 3rd wire trawl cable or trawl unit electronics.

Though a few telemetry errors are quite common and acceptable, an excessive number of errors will adversely affect the sonar operation and may indicate a problem that will eventually cause a system failure.

The most common type of telemetry errors is time-outs. This problem indicates the trawl unit electronics are not responding to the processor unit or the integrated sensor module is not responding to the sonar head.

If the processor unit displays changes in the "Baud Rate" (highlighted in red and flashing) the change indicates that the Uplink signal to the processor may have a problem then refer to the "Message Log" file and record the "Errors" including the cable gain number values and make note of any other failure.

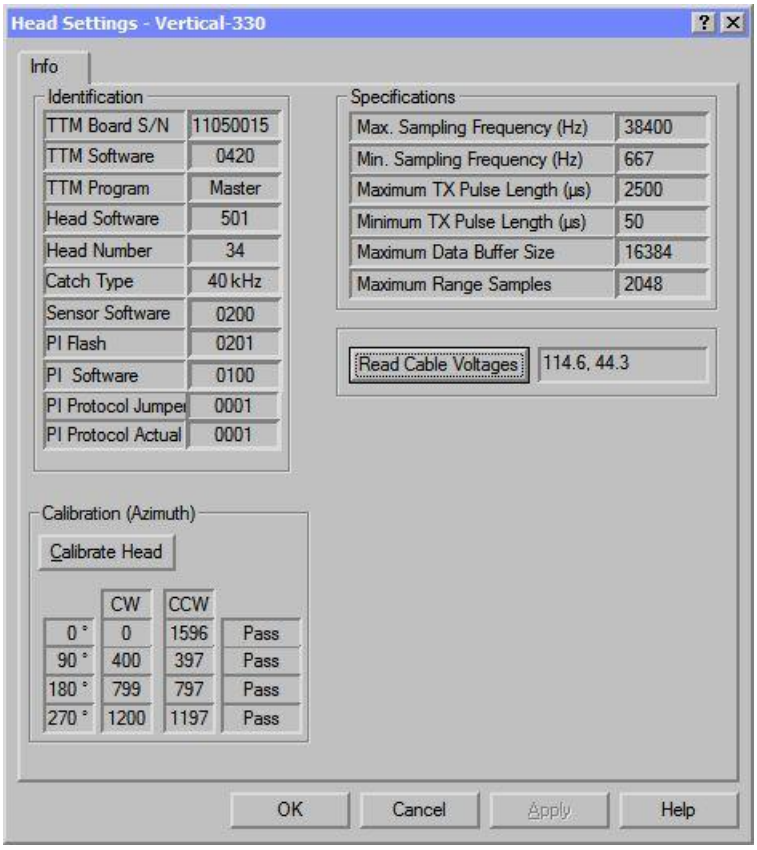
If no errors are recorded in the "Message Log" file, then re-set the baud rate to 115.2 kbps and implement a system re-calibration. Next record the results obtained. The changes may have been caused by noise or other interference.

5.4.7 Diagnostic Recordings

The system will save your screen displays in three different ways. Two of these ways are manually started by the operator and the third is automatically managed by the system. All three methods create files on the system which can be sent to your service provider for analysis.

5.4.8 System Info Page

The System Info Page provides all the pertinent information required by the factory in order to assist you in troubleshooting the FS system on-board the vessel.



5.4.9 Bitmap "Snapshots" Sonar Image

The system will allow you to save snapshots of the screen display. In the lower right hand corner of the display you will see the following display.

To take a snapshot of your display simply left click on the camera icon. A snapshot will be saved in the "diagnostic" folder. When you click the camera icon a grey message box will appear in the top left hand side of your display stating "Saving a sonar image. Please wait." This box will only appear for a second or two but confirms that you have taken a picture and that it has been saved. The snapshot saved will be only of the active window on your display – either the vertical head or the sounder. The system saves both a video picture of your display and a text file listing all of your system settings.

5.4.10 Manual Recordings

You can, at any time, start a recording of your display. To start the recording left clicks on the red button beside the camera icon, (see image above). The recording will continue until you stop it by clicking on the same button again. These recordings are saved into the "record" folder.

The traditional way of starting a recording also still exists on the system. Go to the display toolbar and turn the Record Toolbar on. The traditional recording toolbar will appear on the left side of your display. You will also use this toolbar to playback any of your recordings.

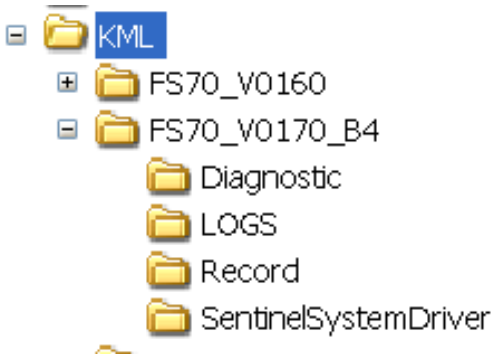
5.4.11 Automatic Recordings

The system is also automatically recording your display without the need for you to do anything at all. The reason for this background recording is to ensure that should you experience difficulties or an error the system will have kept a recording of it for future analysis. This file can then be sent to your service organization for analysis. This file is a four hour recording that continually loops itself ensuring that there is always a recording of the last four (4) hours of operation. These files are saved into the "Diagnostic" folder.

5.4.12 Diagnostic and Message Files Transfer Procedure

To access any of the files that have been saved go to the following directory in your system:

C:\ programs\KML\FS70_ VO1XX



You will see the folders for "diagnostic", "LOGS" and "Record". Your recordings files are saved as follows:

Diagnostic folder:	Any snapshots that you take The auto-run four (4) hour recording
LOGS folder: (automatic)	System messages and error messages

Record folder: Any recordings that you manually start

All of these files are date and time stamped so you will know exactly when they occurred.

If you have experienced a problem with the system you want to ensure that the auto recording of the event will not be overwritten. In this event you want to simply move the file from the "diagnostic" folder and place it into a folder where you will easily be able to find it. This file should be sent to your service provider at your earliest convenience so that they can help determine what has caused the problem.

5.4.13 Diagnosing Problems

The usefulness of these tools is greatly enhanced when they are used on a regular basis to monitor system performance. Records of past system performance (when the unit is operating properly) provide a basis for comparison that may assist in diagnosing the problem when an FS system fails.

If the FS system develops a problem, or if it fails completely, the steps below should be followed.

1. Check the power supply unit meters and record their values. If the failure was on power up, ensure the voltage selection switch is on high and that the power is on. If the system developed a problem or failed while operating, then note the voltage and current meter behaviour. If the current meter jitters, then stop the trawl winch if rotating, and note any changes in the meter values or their behaviour.

2. If the processor unit displays a system test result page then record the values and make note of any failure (highlighted in red). If not, then implement a system test and record the results obtained.

3. Disconnect the trawl unit from the trawl cable and re-connect to the FS system using the test cable, next re-power up the system. If the system failed then you will have to troubleshoot the problem.

5.4.14 Troubleshooting Problems

The first step in troubleshooting the problem would be to retrieve the "Errors" message log file located in the KLM directory as indicated in paragraph 5.4.12. The errors log file will provide some information of what when wrong with the system.

The next step is to understand the "Power up Sequence of Events" when you power up the FS system. By understanding the system sequence of events it will help you in diagnosing where the problem may be.

5.4.15 Power up Sequence of Events

What happens when you turn "ON" the Power/TTM?

1. When you turn ON the TTM you apply power to the Pre-Regulator board located in the sonar head.
2. Next, the pre-regulator board applies power to the main power supply.
3. Next, the main power supply board sets-up the voltages required to run the sonar head.
4. Next the motor will lock up in position "will not rotate freely by hand".

If the Pre-regulator and Power supply boards are functioning correctly, the TTM panel meter should indicate 200Vdc and a current of approx 0.20 Amp.

Troubleshooting system power problems:

- Check TTM Interface unit panel meters for voltage and current, ensure unit is on and confirm voltage meter indicates 200 VDC.
- If no current is indicated then turn power off and disconnect the third wire cable from the TTM Unit. Check wiring continuity between the MS connector and the 2 pin connector at the trawl unit. If OK, then the sonar head needs servicing.

5.4.16 Host FS70 Software Start-up Sequence of Events

In this section we will be addressing the telemetry communication and highlighting the action/problems and the possible causes.

What happens when you start up the host software?

When you start up the FS host software you are establishing **"Digital"** communication with the TTM boards located inside the Power/TTM unit.

The communication is establish between the PC and the TTM using the host software commend by clicking on "Detect Head" if the host do not detect the "Head" you will have to troubleshoot where the problem may be as indicated below.

Troubleshooting head detection problems:

- Check COM port is activated in host software. If not, then activate the COM port and re-detect head.
- If head not detected, then check connection between the PC and TTM. If OK, the TTM needs servicing.

After the host has detected the "digital side" of the TTM board, the "Analog" side of the TTM board and via the LF1 telemetry board unit completes the downlink communication through the LF1 telemetry board located in the sonar head.

5.4.17 What happens when you click "RUN"

The next steps after the host software is detected and you hit the "Run" button are:

- **Cable Calibration**

The CPU board will request a series of transmit pulses from the transmitter to initiate the cable calibration. While this is occurring the surface unit (via the TTM/LF1 board) will increase/decrease the values (returned signal "echo's") via the receiver board and will be uplinked and written to the Digital-to-Analog Converter "DAC" such that the Gain-Detect (monitor by the TTM) is first detected then intentionally turned off and then detected again by changing

the values being uplinked and re-written back to the DACs. The final values written to the DACs directly represent what we refer to as the "Cable Gain Numbers" i.e., example "6, 23" to compensate for the signal loss through the 3rd wire.

The most important steps regarding the Downlink and Uplink communication between the host software, the TTM and the sonar head is completed. If any problems were detected with the TTM/ LF1 telemetry, the LF1 telemetry board in the sonar head, the CPU board, the transmitter or the receiver boards the cable calibration would have failed.

- **Motor Calibration**

After the downloading of the head parameters is completed the host software via the CPU board will request a motor calibration. The motor driver board will come online and calibrate the motor with a series of rotations in order to detect the optocouplers located in the motor housing and set-up each quadrant. The 4 quadrants and calibration numbers will be recorded in the host software "info" page.

If the motor calibration fails the problem may be with the motor controller board of the optocouplers located in the motor housing.

- **Sensors Info Request**

The next step the host must know what is connected to the system in respect to the type of sensors. A command requesting is downlinked to the head CPU board, the CPU will request the info from the sensors controller board, e.g., Catch sensors, temp and depth, Door Spread sensors etc. After the controller board has completed the detection the info is uplinked back to the host software via the CPU, LF1 telemetry board in the sonar head, then uplinked to the TTM via the LF1 telemetry board.

After the Host has received the information then the sensors page including the data will be displayed on the sonar image.

If no sensor information is displayed on the sonar image you may have a problem with the sensor controller board. If the internal sensors are displayed but no external sensors are shown then the problem may be with the catch hydrophone receiver or the associated circuits. If only some of the sensors are displayed you may have a problem with a specific sensor that was not detected. You will have to troubleshoot the problem.

- **User Setting**

If all OK and no errors are posted into the log files then the host will download the selected "User Setting" to the head.

NOTE: If any of the above host Downlink commands have issued a requested and a reply is not Uplinked back to the host, those errors are posted in the log file. Therefore you are having some Downlink or Uplink telemetry problem. If this is the case you will have to troubleshoot the problem.

The problem may be located in the TTM/LF1 telemetry boards or the LF1 telemetry boards located in the head. The best way to determine the problem would be to replace the head or the TTM with a serviceable spare unit.

Problems and the possible causes:

Problem	**Action/Possible Cause**
Complete system and/or calibration failure - cable gain at maximum, telemetry errors are logged in the file.	Check for telemetry errors. If none, then problem is with the sonar head or the TTM unit.
Sonar head operates correctly but pauses periodically - may not have sensor module data	Check Message Log for errors. If multiple errors are present then the internal sensor module may be defective. Check by restarting the system.
Sonar head operates correctly but image is skewed or distorted.	Check for calibration errors in sonar head positioning. If calibration errors are present then sonar head may be defective. Otherwise check that sonar head is properly mounted in trawl housing.

Sonar head operates correctly but the cable gain is higher than normal and telemetry errors may be present.	Problem may be with the sonar head or the TTM interface unit. Replace sonar head and repeat the test. If problem re-occur then the problem is with the TTM/LF1 otherwise the problem is in the previous sonar head.
No sensor module data.	Internal sensor module electronics is defective.
No catch indication but Depth and Temp are OK.	Ensure catch sensors are properly charged and display of catch data is enabled. Check unit on deck with catch sensor placed 1 meter from receive transducer. Connect wire from "+" lug to metal lid on back of catch sensor, wait a couple minutes and verify display. If no indication or indication is wrong, then fault is with the internal sensor module.

NOTE: If the FS unit is diagnosed as being faulty, then the unit(s) should be returned to an authorized Simrad service centre. ALL system performance results and a complete description of the problem should be supplied with the defective unit to assist in its repair.

5.5 Catch sensors

Refer to your **SIMRAD** FA or PI Sensor Operator and Service Manual.

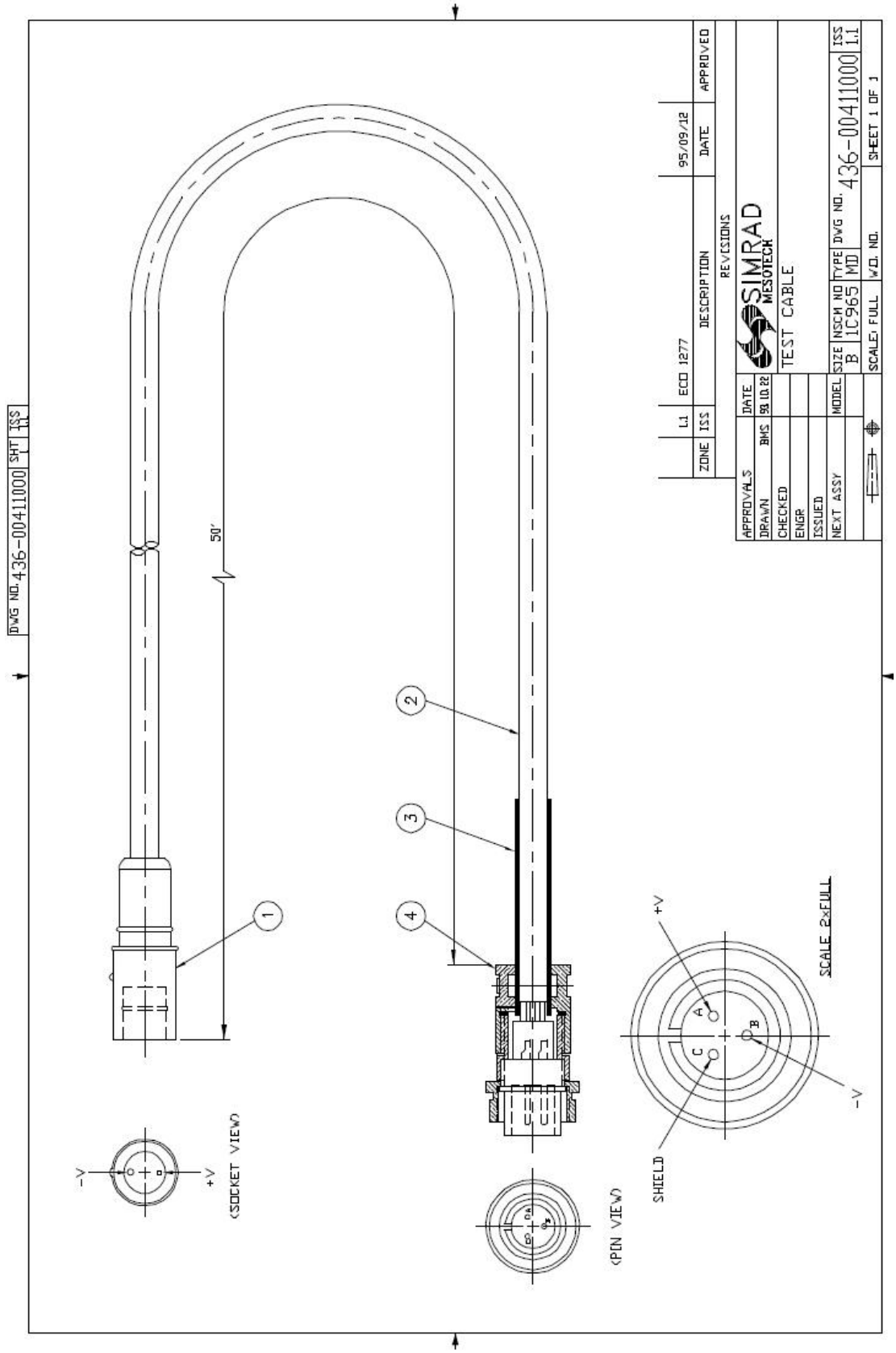
5.6 Winch slip-rings and trawl cable

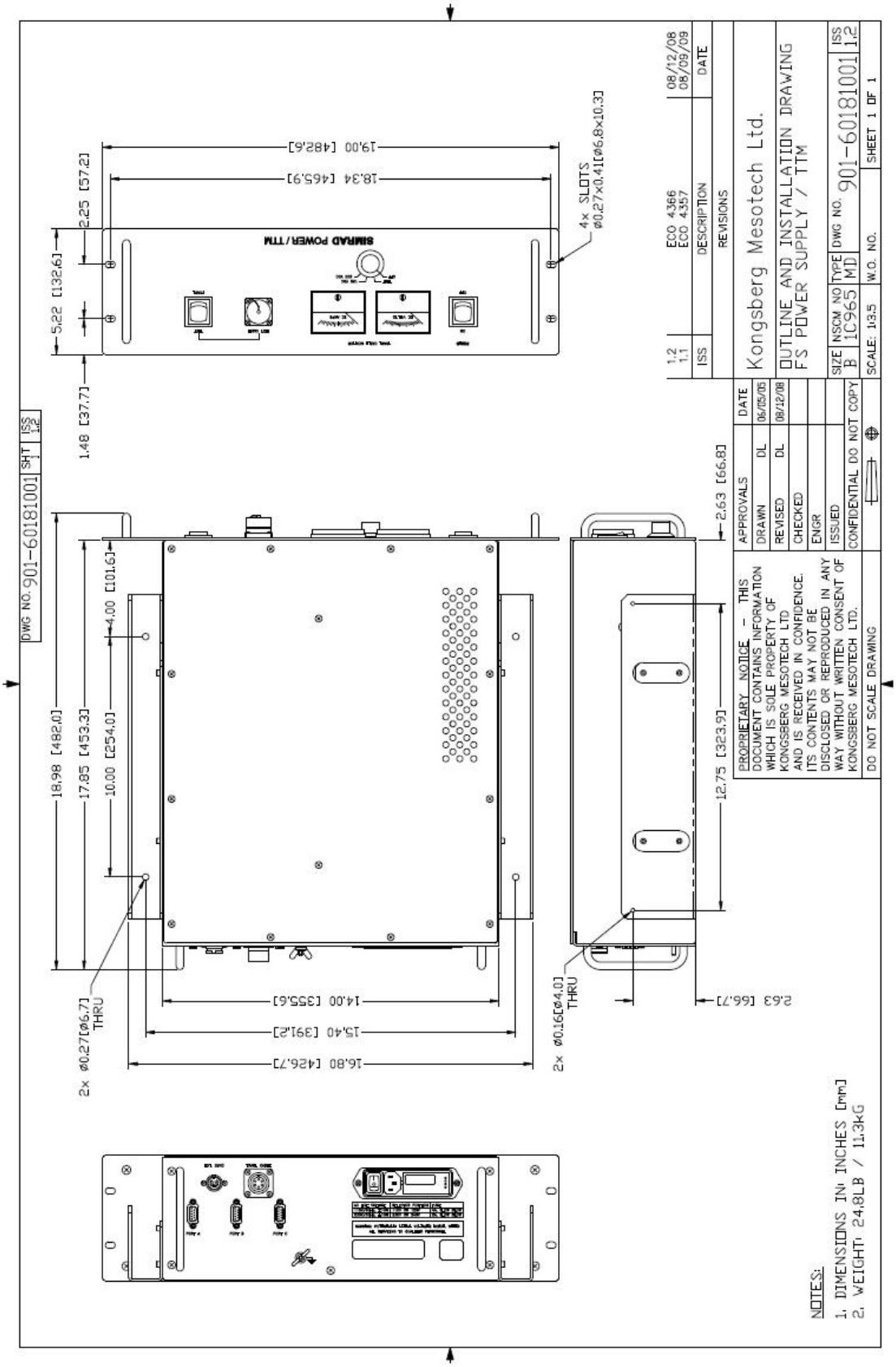
Refer to your Manufacturer Operator and Installation Manual.

6 DRAWINGS

Drawings List

- 436-00411000 - Test Cable
- 901-60181001 - FS power/TTM Outline Dwg
- 901-60181003 - FS Power/TTM Wiring Diagram
- 974-80161000 - FS 70 Housing Dwg (4 Dwgs)


DWG NO. 436-00411000 SHT ISS 1.1
50'
1
2
3
4
-V
+V
(SOCKET VIEW)
(PIN VIEW)
SHIELD
A
B
C
SCALE 2×FULL
ZONE ISS
L.1 ECO 1277 95/09/12
DESCRIPTION DATE APPROVED
REVISIONS
SIMRAD MESOTECH
APPROVALS DATE
DRAWN BMS 91.10.22
CHECKED
ENGR
ISSUED
NEXT ASSY
TEST CABLE
SIZE B
NSCM NO 1C965
TYPE MD
DWG NO. 436-00411000 ISS 1.1
SCALE: FULL
W/O. NO.
SHEET 1 OF 1


DWG NO. 901-60181001 SHT 1 ISS 1.2
1.2 ECO 4366 08/12/08
1.1 ECO 4357 08/09/09
ISS DESCRIPTION DATE
REVISIONS
Kongsberg Mesotech Ltd.
OUTLINE AND INSTALLATION DRAWING
FS POWER SUPPLY / TTM
SIZE B NSCM NO 1C965 TYPE MD DWG NO. 901-60181001 ISS 1.2
SCALE: 1:3.5 W.O. NO. SHEET 1 OF 1
CONFIDENTIAL DO NOT COPY
DO NOT SCALE DRAWING
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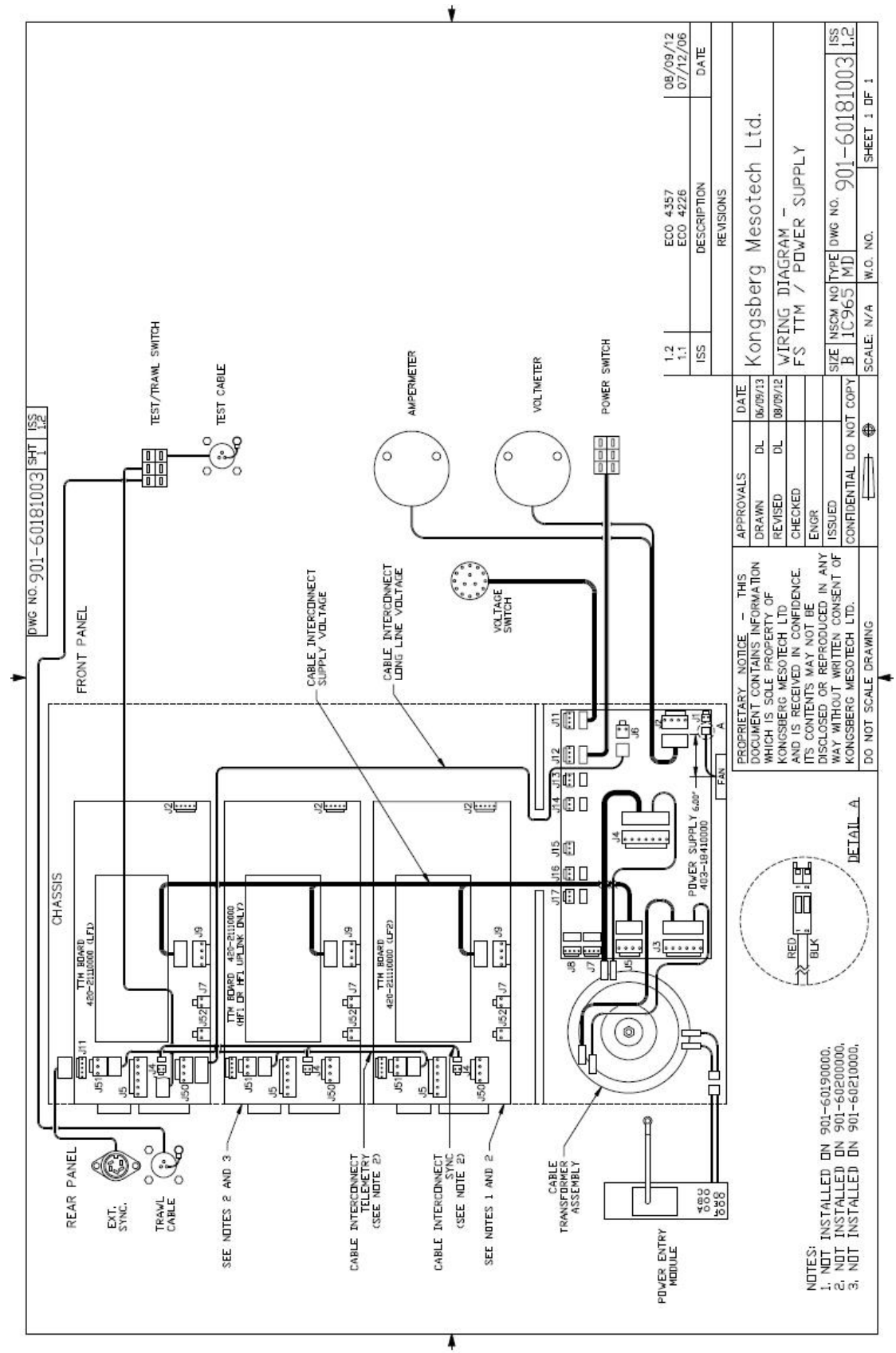
APPROVALS DATE
DRAWN DL 06/05/06
REVISED DL 08/12/08
CHECKED
ENGR
ISSUED
NOTES:
1. DIMENSIONS IN INCHES [mm]
2. WEIGHT: 24.8LB / 11.3KG
19.00 [482.6]
18.34 [465.9]
4× SLOTS Ø0.27x0.41[Ø6.8x10.3]
2.25 [57.2]
5.22 [132.6]
1.48 [37.7]
SIMRAD POWER/TTM
18.98 [482.0]
17.85 [453.3]
10.00 [254.0]
4.00 [101.6]
2× Ø0.27[Ø6.7] THRU
14.00 [355.6]
15.40 [391.2]
16.80 [426.7]
2.63 [66.8]
12.75 [323.9]
2× Ø0.16[Ø4.0] THRU
2.63 [66.7]


DWG NO. 901-60181003 SHT 1 ISS 1.2
FRONT PANEL
CHASSIS
REAR PANEL
EXT. SYNC.
TRAWL CABLE
TEST/TRAWL SWITCH
TEST CABLE
AMPERMETER
VOLTMETER
POWER SWITCH
VOLTAGE SWITCH
CABLE INTERCONNECT SUPPLY VOLTAGE
CABLE INTERCONNECT LONG LINE VOLTAGE
TTM BOARD 420-2110000 (LF1)
TTM BOARD 420-2110000 (HF1 OR HF1 UPLINK ONLY)
TTM BOARD 420-2110000 (LF2)
POWER SUPPLY 403-1810000
FAN
SEE NOTES 2 AND 3
CABLE INTERCONNECT TELEMETRY (SEE NOTE 2)
CABLE INTERCONNECT SYNC (SEE NOTE 2)
SEE NOTES 1 AND 2
CABLE TRANSFORMER ASSEMBLY
POWER ENTRY MODULE
DETAIL A
RED
BLK
NOTES:
1. NOT INSTALLED ON 901-60190000,
2. NOT INSTALLED ON 901-60200000,
3. NOT INSTALLED ON 901-60210000.
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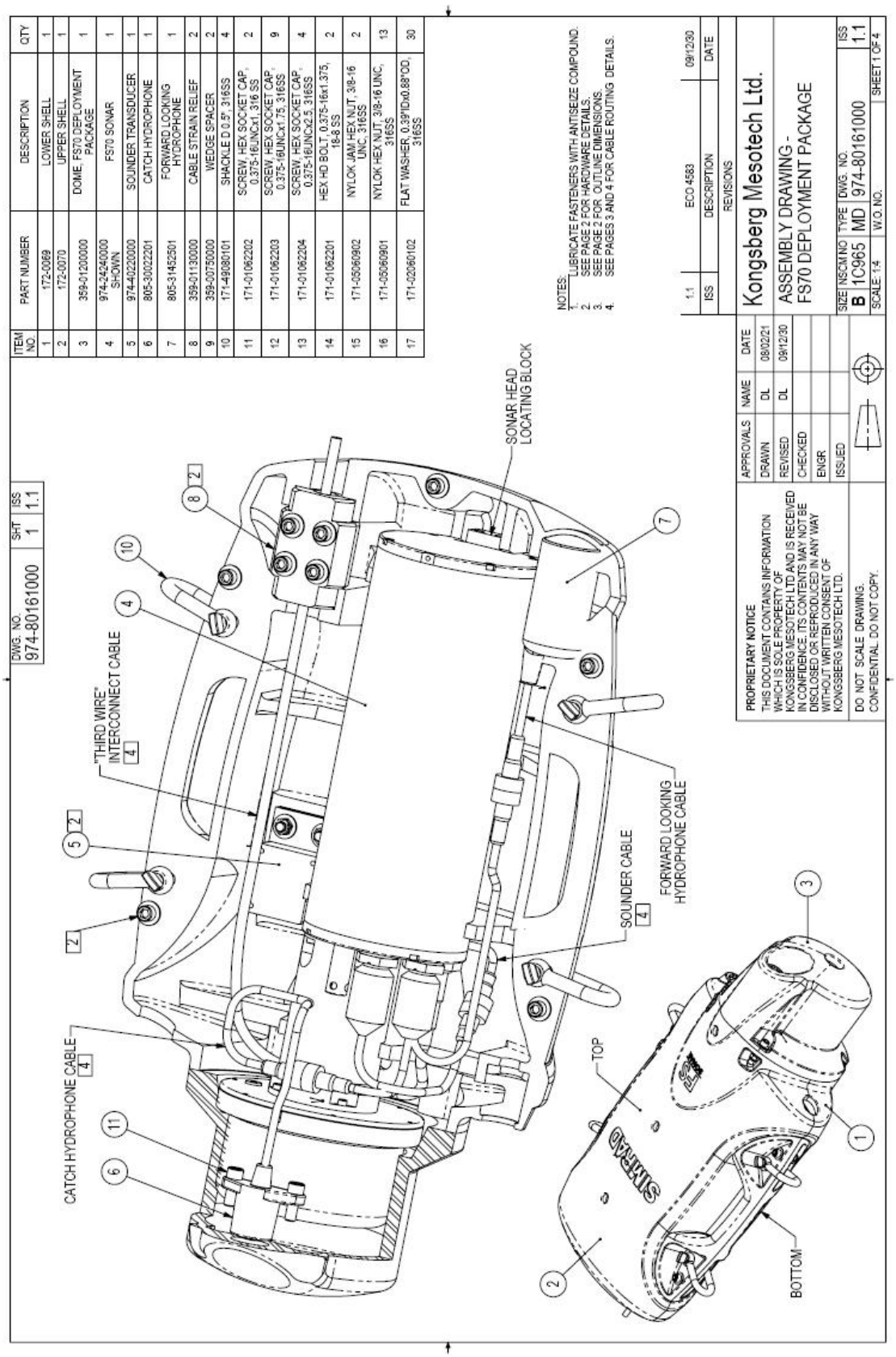
DRAWN DL 06/09/13
REVISED DL 08/09/12
CHECKED
ENGR
ISSUED
CONFIDENTIAL DO NOT COPY
DO NOT SCALE DRAWING
ISS 1.2 1.1
ECO 4357 ECO 4226
08/09/12 07/12/06
DESCRIPTION DATE
REVISIONS
Kongsberg Mesotech Ltd.
WIRING DIAGRAM - FS TTM / POWER SUPPLY
SIZE B NSCM NO 1C965 TYPE MD DWG NO. 901-60181003 ISS 1.2
SCALE: N/A W.O. NO.
SHEET 1 OF 1


DWG. NO. 974-80161000
SHT 1
ISS 1.1
ITEM NO. | PART NUMBER | DESCRIPTION | QTY
1 | 172-0069 | LOWER SHELL | 1
2 | 172-0070 | UPPER SHELL | 1
3 | 359-01200000 | DOME, FS70 DEPLOYMENT PACKAGE | 1
4 | 974-24240000 SHOWN | FS70 SONAR | 1
5 | 974-40220000 | SOUNDER TRANSDUCER | 1
6 | 805-30022201 | CATCH HYDROPHONE | 1
7 | 805-31452501 | FORWARD LOOKING HYDROPHONE | 1
8 | 359-01130000 | CABLE STRAIN RELIEF | 2
9 | 359-00750000 | WEDGE SPACER | 2
10 | 171-49080101 | SHACKLE D 0.5", 316SS | 4
11 | 171-01062202 | SCREW, HEX SOCKET CAP, 0.375-16UNCx1, 316 SS | 2
12 | 171-01062203 | SCREW, HEX SOCKET CAP, 0.375-16UNCx1.75, 316SS | 9
13 | 171-01062204 | SCREW, HEX SOCKET CAP, 0.375-16UNCx2.5, 316SS | 4
14 | 171-01062201 | HEX HD BOLT, 0.375-16x1.375, 18-8 SS | 2
15 | 171-05060902 | NYLOK JAM HEX NUT, 3/8-16 UNC, 316SS | 2
16 | 171-05060901 | NYLOK HEX NUT, 3/8-16 UNC, 316SS | 13
17 | 171-02060102 | FLAT WASHER, 0.39"IDx0.88"OD, 316SS | 30
NOTES:
1. LUBRICATE FASTENERS WITH ANTISEIZE COMPOUND.
2. SEE PAGE 2 FOR HARDWARE DETAILS.
3. SEE PAGE 2 FOR OUTLINE DIMENSIONS.
4. SEE PAGES 3 AND 4 FOR CABLE ROUTING DETAILS.
ISS 1.1 | DESCRIPTION: ECO 4583 | DATE: 09/12/30
REVISIONS
Kongsberg Mesotech Ltd.
ASSEMBLY DRAWING - FS70 DEPLOYMENT PACKAGE
SIZE B | NSCM NO 1C965 | TYPE MD | DWG. NO. 974-80161000 | ISS 1.1
SCALE: 1:4 | W.O. NO. | SHEET 1 OF 4
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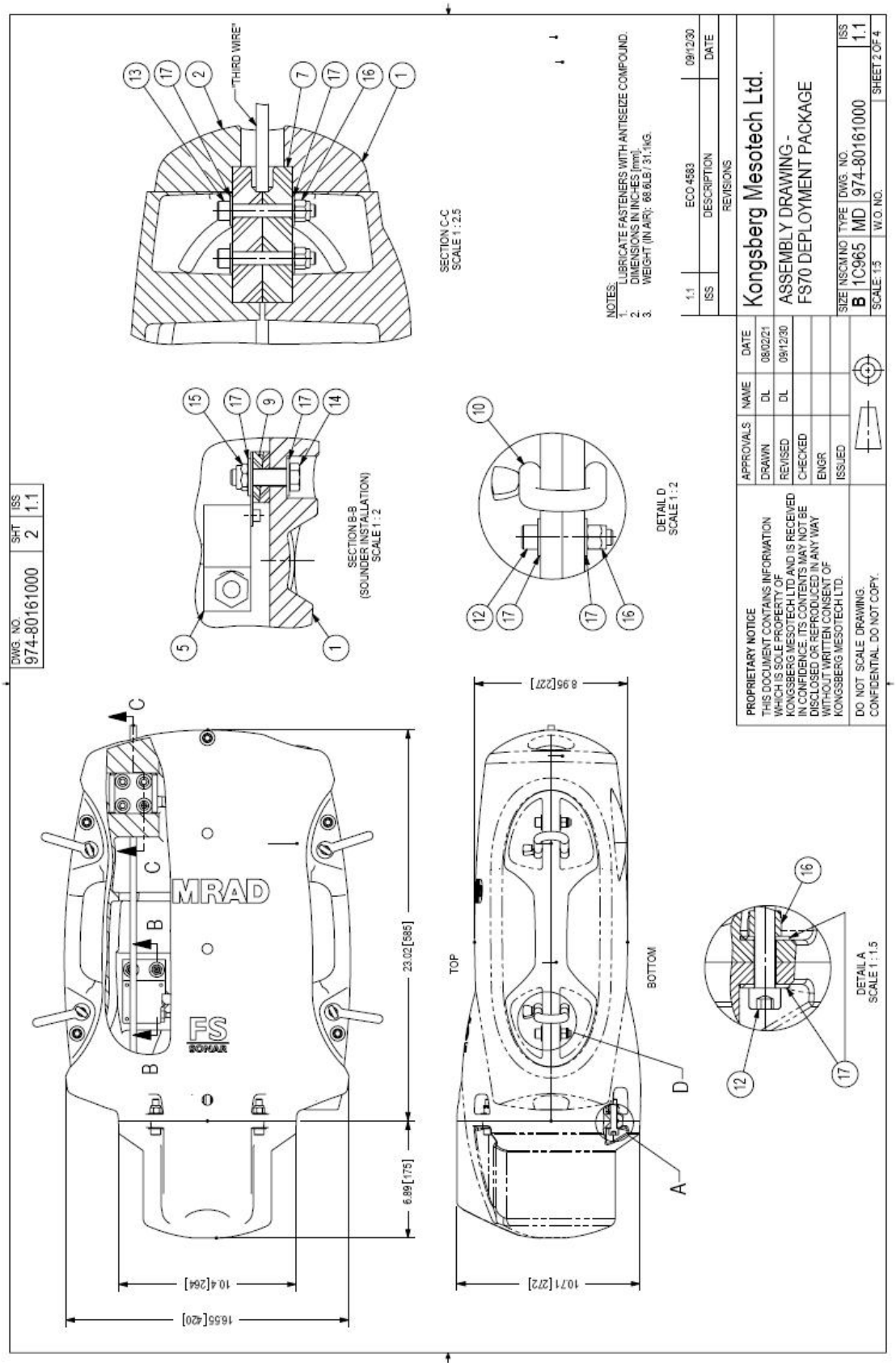
CONFIDENTIAL. DO NOT COPY.
APPROVALS | NAME | DATE
DRAWN | DL | 08/02/21
REVISED | DL | 09/12/30
CHECKED
ENGR
ISSUED
"THIRD WIRE" INTERCONNECT CABLE 4
CATCH HYDROPHONE CABLE 4
SONAR HEAD LOCATING BLOCK
SOUNDER CABLE 4
FORWARD LOOKING HYDROPHONE CABLE
TOP
BOTTOM
SIMRAD


DWG. NO. 974-80161000
SHT 2
ISS 1.1
"THIRD WIRE"
SECTION C-C SCALE 1 : 2.5
NOTES:
1. LUBRICATE FASTENERS WITH ANTISEIZE COMPOUND.
2. DIMENSIONS IN INCHES [mm].
3. WEIGHT (IN AIR): 66.6LB / 31.1KG.
1.1 ECO 4583 09/12/30
ISS DESCRIPTION DATE
REVISIONS
Kongsberg Mesotech Ltd.
ASSEMBLY DRAWING - FS70 DEPLOYMENT PACKAGE
SIZE B
NSCM NO 1C965
TYPE MD
DWG. NO. 974-80161000
ISS 1.1
SCALE: 1:5
W.O. NO.
SHEET 2 OF 4
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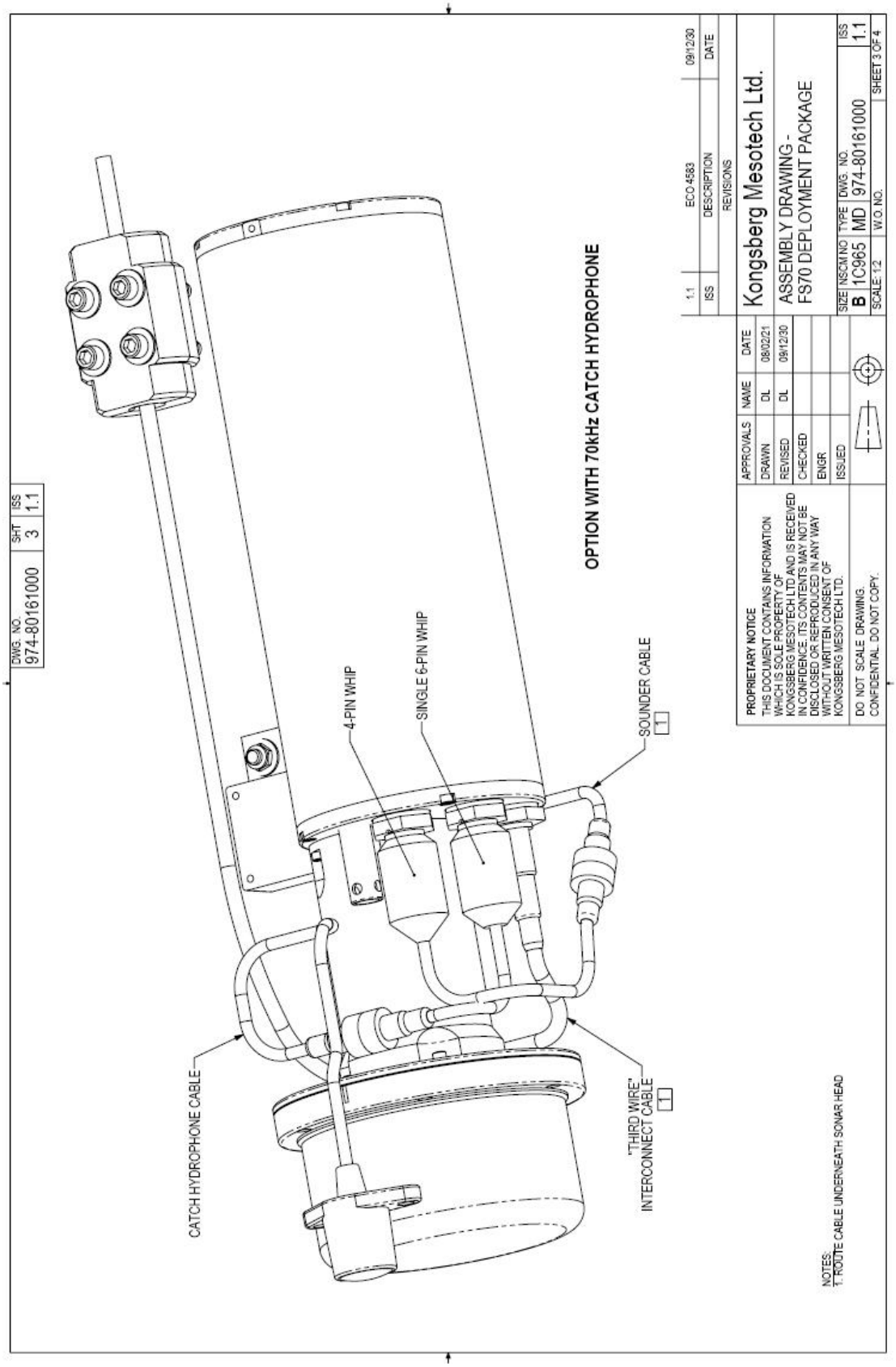
APPROVALS NAME DATE
DRAWN DL 08/02/21
REVISED DL 09/12/30
CHECKED
ENGR
ISSUED
SECTION B-B (SOUNDER INSTALLATION) SCALE 1 : 2
DETAIL D SCALE 1 : 2
DETAIL A SCALE 1 : 1.5
MRAD
FS
TOP
BOTTOM
23.02[585]
6.89[175]
16.55[420]
10.4[264]
8.95[227]
10.71[272]


OPTION WITH 70kHz CATCH HYDROPHONE
4-PIN WHIP
SINGLE 6-PIN WHIP
SOUNDER CABLE
1
CATCH HYDROPHONE CABLE
"THIRD WIRE" INTERCONNECT CABLE
1
NOTES:
1. ROUTE CABLE UNDERNEATH SONAR HEAD
DWG. NO. 974-80161000
SHT 3
ISS 1.1
1.1 ECO-4583 09/12/30
ISS DESCRIPTION DATE
REVISIONS
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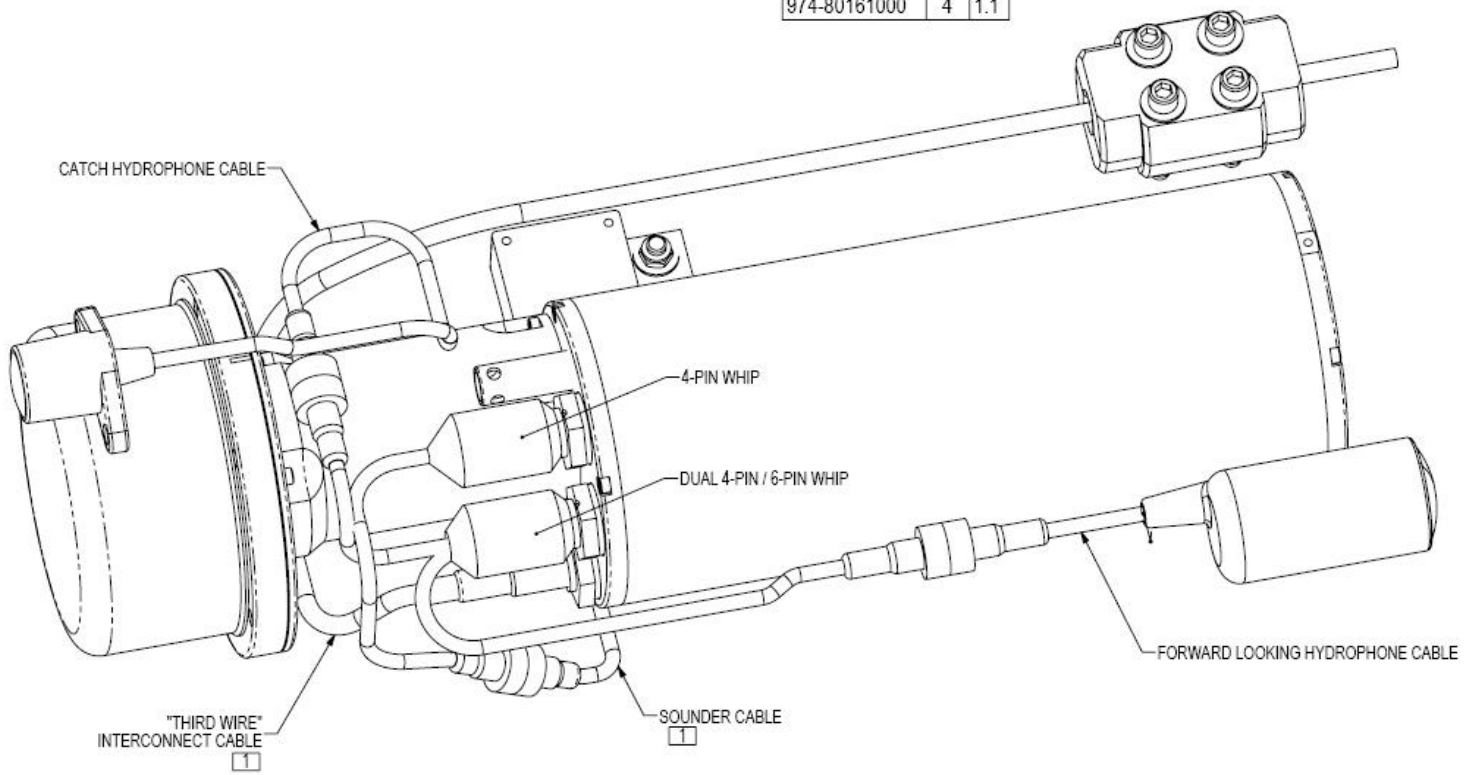
APPROVALS NAME DATE
DRAWN DL 08/02/21
REVISED DL 09/12/30
CHECKED
ENGR
ISSUED
Kongsberg Mesotech Ltd.
ASSEMBLY DRAWING - FS70 DEPLOYMENT PACKAGE
SIZE NSCM NO TYPE DWG. NO. ISS
B 1C965 MD 974-80161000 1.1
SCALE: 1:2 W.O. NO. SHEET 3 OF 4

DWG. NO.	SHT	ISS
974-80161000	4	1.1



OPTION WITH 40kHz CATCH HYDROPHONE AND FORWARD LOOKING HYDROPHONE

NOTES:
1. ROUTE CABLE UNDERNEATH SONAR HEAD

ISS	DESCRIPTION	DATE
1.1	ECO 4583	09/12/30

REVISIONS

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APPROVALS	NAME	DATE
DRAWN	DL	08/02/21
REVISED	DL	09/12/30
CHECKED		
ENGR		
ISSUED		

Kongsberg Mesotech Ltd.

ASSEMBLY DRAWING -
FS70 DEPLOYMENT PACKAGE

SIZE	NSCM NO	TYPE	DWG. NO.	ISS
B	1C965	MD	974-80161000	1.1

SCALE: 1:2 | W.O. NO. | SHEET 4 OF 4

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ANNEX A – FS SONAR TEST REPORT

Boat Name: _____

Head Type: _____

Part Number: _____ Serial Number: _____

Sensor Module Type: _____

Part Number: _____ Serial Number: _____

	Cable Gain	Cable / Pre-Reg. Voltage
Shop Test Cable:	_____	_____
Ship Test Cable:	_____	_____
Ship Trawl Cable:	_____	_____

Ship 3rd wire cable loop resistance: _____

Errors Log:_____

_____

NOTES: _____

_____

_____

_____

Tested by: _____Date: _____

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WARRANTY POLICY

Effective January 1, 2010

Kongsberg Mesotech Ltd. Warrants each new product (equipment) to be free of defects caused by faulty materials or poor workmanship for a period of twenty-four (24) months for underwater and surface equipment from date of installation by an authorized Kongsberg Group Company, Simrad Distributor, Dealer or Agency. The warranty does not apply to defects caused by force majeure events or misuse including water damage to the surface equipment, improper maintenance and installation or including excessive wear and tear for which Kongsberg Mesotech Ltd. is not responsible.

Underwater Equipment:

Warranty for Underwater Equipment that is hull mounted, such as those mentioned below, will be assessed on a **case-by-case** basis but shall generally not be covered by the warranty:

- Hull Units, Sonar Dome Assemblies and Echo Sounder Transducers
- Transducer Units, Speed, Temperature and Depth Sensors

NOTE: Additional expenses connected with replacement of transducers, such as dry-docking and diving, are not covered by this warranty.

Warranty on Parts or Equipment Replacement:

It is at the sole discretion of Kongsberg Mesotech Ltd. to either repair or replace any unit/part that fails within the limits of the Warranty Policy.

The Warranty Policy is only valid on new equipment

Replacement of parts, components, and/or PCB Boards during a warranty repair does not extend the original warranty period.

Consumable Materials:

Consumable materials, such as lamps, fuses, O-rings, gaskets and batteries, will not be replaced free of charge.

Warranty Service:

Warranty service is available worldwide through authorized Kongsberg Group Companies, Simrad Distributors, Dealers or Agencies. When requesting warranty service, you must supply the following information:

1. Proof of purchase.
2. Equipment part number and serial number.
3. Fault description and all relevant vessel information.

Labour cost for the repair or replacement of any products/equipment and/or module/parts is the responsibility of the servicing agent or dealer.

All customs duties, brokerage charges local taxes, overtime, expenses for meals, tools, launch services, ferries, lodgings, normal adjustments and routine maintenance are not covered by this warranty policy.

DISCLAIMER

Maximum liability shall not, in any case, exceed the contract price of the products claimed to be defective.

Consequential damages including, but not limited to, any loss of profit, property damage or personal injury, are not covered by the warranty policy.

This equipment is not certified or approved for navigation and/or safe-navigation practices, and is not to be used for navigation purposes under any circumstances.

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